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Vol. X

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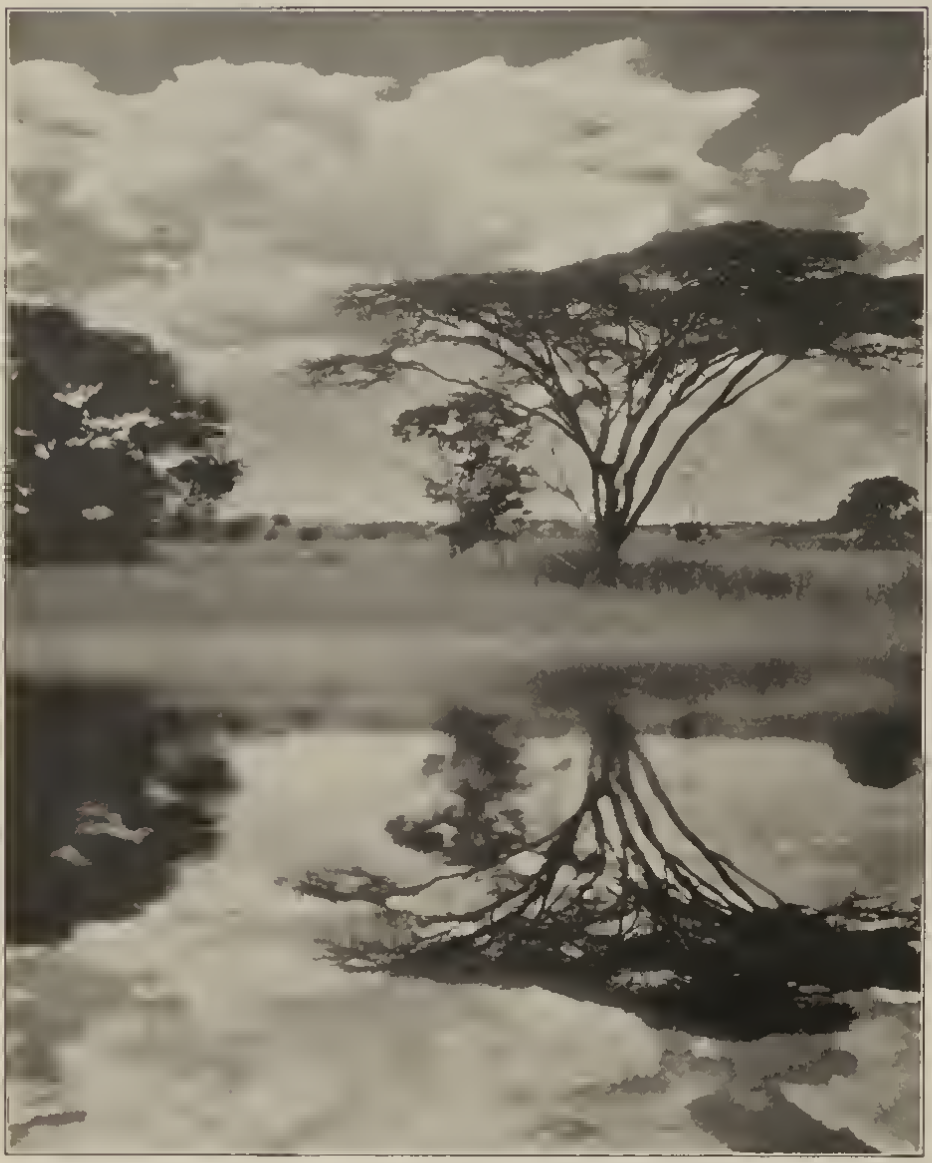


• An African Sentinel

This striking study was made in Africa by Bob Roberts of M-G-M.

CINEMATOGRAPHY AND THE TALKIES

Some Honest Criticism by a Former Cameraman

By BERT GLENNON

Mr Glennon now a noted director formerly was an ace Cinematographer and an officer of the American Society of Cinematographers His observations are particularly pertinent due to his varied experience Among the great pictures he photographed were The Ten Commandments and The Patriot His recent directorial achievements are Syncopation and The Fire Walker —ED NOTE

IN ALL the thirty odd years through which cinematography has grown from a laboratory experiment to its present commanding position among the artistic crafts it has never been in a more anomalous nor a more dangerous position

On the one hand it has reached a state of great mechanical perfection but on the other hand its artistic growth has been arrested in the past year, and on every side we see irrefutable evidence that the art of the camera upon which all screen art is based is in danger of being overlooked and becoming stagnant and buried beneath a great maze of ohms watts amps and thoughtlessness

Of course it is only natural that the addition of the utterly new element of sound with its bewildering array of new apparatus and new requirements should upset everything while it was a novelty and its technique an unknown quantity But with the very general knowledge of sound technique now prevalent there is no excuse for any production department s dropping one whit below former standards least of all so highly intelligent and artistic a group as the camera departments It is up to the cameramen to stand on their own feet and see to it that their art is not allowed to suffer Yell to high Heaven for time to light your sets properly, do anything you must to maintain that high artistic standard that marked the silent pictures just before sound came in

Cinematographers of today have far more perfect mechanical facilities with which to work than have ever before been available Their cameras have improved Their lenses are better Their film is immeasurably better and modern incandescent lighting equipment is the most marvelous artistic tool in the the world With all these improvements the photography should rise to superlative heights

Perhaps though this very abundance is a contributing factor to the camera s delinquency during the past year Formerly, with a relatively limited amount of physical equipment at hand a cinematographer had to rely on his wits to get the most out of every scene Today he knows that if he slaps all his available equipment onto the set roughly according to formula he will have light enough falling in front of his lens to produce a commercially successful negative Therefore if you will pardon the criticism most modern sets are grossly overlit

Go onto almost any set in any studio today and notice the tremendous amount of lighting used—particularly the greatly increased front lighting which is more than double or treble the amount used a few years ago Even a little too much front lighting tends to kill the artistic effects of your other lights and spoil your modelling Obviously such a glaring excess as is now prevalent makes matters worse

This may be due to the advent of sound with the constant mental and physical hazards that sound has placed in front of all who are just now starting to become familiar with it But whatever the reason I feel that the cinematographers should cut down on this excess of lighting and try to get back to the standards of the silent drama of just a short while ago

This article may seem harshly critical but criticism of the proper kind is good for us all Too frequently most of us after reaching a certain measure of success, fail to struggle harder to improve We feel that we are good and when we reach that point we are treading on dangerous ground and need someone to come along and give us a crack that will wake us up to the fact that we are slowly but surely sliding backward. My heart and soul are in the A S C Until recently I was a cameraman, and a member of that organization And it is because I believe the American cameramen are the masters of the cinematographic art of the world and wish to see them maintain that high place that I offer my criticism

BERT GLENNON
In the days when he was a Cinematographer

Many people are inclined today to blame the present vogue of multiple camera shooting for the imperfections in photography Nonsense It is merely the old, old de Mille technique of picture making plus a few microphones When Alvin Wyckoff, A S C, was chief cinematographer for Cecil deMille he made all his pictures that way When I was in the same position, so did I Now Peverell Marley is doing the same thing And we used just as many cameras is those days as talkie companies do now perhaps more

When we were making *The Ten Commandments* our general set-up was about this my long shot camera in one spot Beside it the two-shot camera, then two or three cameras making closeups with only an occasional two-shot Now with the addition other cameras making angle shots We would rehearse all morning and then shoot all the rest of the day By evening we would have fifty or more scenes in the box—good ones, too No, multiple cameras can't take all the blame for the shortcomings in artistic lighting

However there is one phase of talkie technique that cannot escape its full share of blame This is the greatly increased use of two shots Formerly, pictures were told in long-shots and closeups, withonly an occasional two shot Now with the addition of dialogue the cameras are often required to photograph a pair of actors cutting at about the knees by far the most difficult sort of shot to light and make a pleasing composition of I remember telling a friend of mine an executive, who several years ago asked me for a formula by which to test cameramen this "if a man comes to you and you don't know how good he is have him make you a test shot of two people cutting them off at the knees That will show him up Almost any good cameraman can make an attractive long shot or close-up but it takes a real artist to make a beautiful two-shot"

I am afraid that the cinematographers of today are inclined to put mechanics ahead of artistry perhaps due to the advent of so much mechanics in the making of pictures But they must not forget artistry Artistry is the soul of the picture, and a true artist will stand out over an expert in photographic mechanics We have plenty expert mechanical craftsmen We need more artists

In the past Hollywood has had the greatest number of camera-artists in the world on its sets Most of them are still here and still in pictures But too many of them are resting idly on their laurels—forgetting their art for the maze of mechanics and time clocks that now hold sway I am convinced that the industry's greatest need today is for these men to rouse themselves—to remember that, first of all they are *artists*, and again put their hearts into the production of the artistic camera work of which they are capable

I grant you that at times it seems today as though there is little incentive to the development of artistic sense I grant you

(Continued on Page 45)

EASTMAN CLASSROOM FILMS EDUCATIONAL FEATURE

Children Taught by Motion Pictures Benefit Greatly

COMPARATIVELY few persons who nightly go to see the great motion picture stars at the theatres in the stupendous productions realize the important position the motion picture has assumed in the education of the American Youth And daily the importance of the film in the classroom is growing

It was back in 1922 that the National Education Association appointed a committee to investigate the whole general field of motion pictures in their application to classroom work At that time the committee conferred with officials of the Eastman Kodak Company with the result that the Eastmas Company began a survey of the field This was followed by the announcement by George Eastman, in behalf of his company in 1926 that the Eastman organization would undertake an experiment to determine the following questions-

DR T L FINEGAN

1 Is it feasible to measure the value of films as a teaching agency?

2 Do films have a teaching value which justifies their purchase for school use?

3 Can such films be produced within cost limits that put them within the purchasing power of the schools?

The Eastman Company provided the funds for the production of the films supplied the projectors, screens and other equipment Dr B D Wood of Columbia University and Dr F N Freeman of the University of Chicago were chosen to supervise the preparation of the films and to assume direction and supervision of the tests that would be given to determine their value as teaching agencies

School authorities of twelve cities cooperated They were Newton Mass., Detroit Mich., Lincoln, Neb., Kansas City Mo Winston-Salem N C Rochester, N Y Chicago Ill., Denver Col., San Diego Cal Atlanta, Ga and New York City Approximately 10 000 children were included in the experiment Five thousand being taught without films and five thousand with. There was much enthusiasm shown on the part of all concerned and two courses were designed one in Geography and one in General Science A twelve-week course was given

The scenarios from which the films were prepared were done by groups of trained experienced teachers Each topic was studied to determine the fundamental knowledge related to it which should be presented in the classroom No thought was given to entertainment value whatever The scenarios were prepared solely with the thought of instruction behind them The films were constructed along lines which it was hoped would arouse the child's mental powers and induce him to desire more information and lead him to make his own personal investigations The films were designed to aid the teacher in classroom work, and not to be a substitute for any work

Comprehensive tests were given at the beginning and end of the film experiment These tests were prepared by Dr Wood and Dr Freeman assisted by graduate students of ample training The teachers in the schools where the tests were given were not permitted to have anything to do with them nor were they permitted to even see them

The result as presented by Dr Thomas E Finegan, President of the Eastman Teaching Films Inc., befoee the Society of Motion Picture Engineers showed that the work of the film groups was distinctly superior to that of the group that did not have the aid of the films In General Science the film group gained 111 per cent of the average gain of both groups together In Geography the film group gain was 117 9 per cent of the average of both groups

However, the directors of the tests declared that the tests could not adequately measure or even roughly register all of the contributions of these films More than 90 per cent of the teachers whose pupils took part in the experiment expressed the opinion that the films were highly effective in stimulating the interests of the children and they declared that this interest was sustained and not a passing one Weeks after a topic had been illustrated by films the children would bring material to the classroom related to the topic but which had just come under their observation

The teachers declared that the films increased the quality and quantity of children's reading, stimulated greater freedom in discussion and resulted in more extensive writing by the children than they had been able to secure without films The teachers also declared that the films contribute to richness of material and accuracy, that the children get clearer information in many ways than they can get from reading, and that many things not readily understandable on the printed page are clear on the film It was also pointed out by the teachers that the films developed a marked improvement and range and accuracy of vocabulary

So when the result of the tests became known and it was seen that films could be of such material aid in classroom work the Eastman organization organized a separate subsidiary company, Eastman Teaching Films Inc to take charge of the development of an adequate program.

Dr Thomas E Finegan former Deputy Commissioner of Education of the State of New York and Superintendent of Public Instruction of the State of Pennsylvania was called to the presidency of the new company

Dr Finegan immediately threw himself into the task of bringing the finest films to the classroom He surrounded himself with a large and competent staff of practical teachers to develop a program of classroom films The development of a library of films adequate to the educational needs of the various institutions of learning is planned In the development of these films those topics which may best be illustrated by motion are selected The cooperation of leading research students and of large numbers of distinguished scholars from the public school field and the faculties of leading universities and technical institutions is assueed

The classroom films differ from many excellent commercial films, as well as from theatrical films They are not primarily to entertain They do not undertake to tell the whole story of a topic They are made to stimulate and arouse the interest of children to induce them to think for themselves ask questions and investigate

The greatest care is taken in the making of these pictures Each film is shot from a carefully prepared scenario and represents a high standard of photography Experienced cameramen photograph the scenes and nearly all scenes used in Eastman classroom films are taken especially for such films by Eastman cameramen A director and cameraman for example, were sent to the Panama Canal to photograph scenes for a film on that subject Another cameraman was sent to Alaska for films on that country

A wide variety of subjects have already been covered and more and more subjects are being brought out Civics Manual Training, Biology Chemistry, General Science and Geography comprise the most of the subjects The classroom films are wielding a wide influence and Dr Finegan and his staff are constantly striving to bring a wider scope of information to the classroom screen with the result that these films are becoming one of the outstanding features of modern educational institutions

They are available to schools at a really moderate figure

SEVENTY MILLIMETRES

The First of the New Wide Film Processes Reaches Production

By WILLIAM STULL A S C

FOR THE past few months the outstanding topic of discussion in cine technical circles has been *wide film* Sound and Color are accepted realities but wide film is generally unknown and yet so inevitable a development that everyone is seeking to learn about it At the same time the various firms which have been experimenting with new film standards have been extremely reluctant to reveal the results of their researches

However within the last thirty days, announcement has been made by the Fox Company and its subsidiaries that not only are there several pictures completed or in production on their new *Grandeur* film but that *Grandeur* apparatus is immediately available on the open market

This announcement naturally focuses the spotlight on *Grandeur* and gives rise to the question What is *Grandeur* how is it made and what are its advantages? '

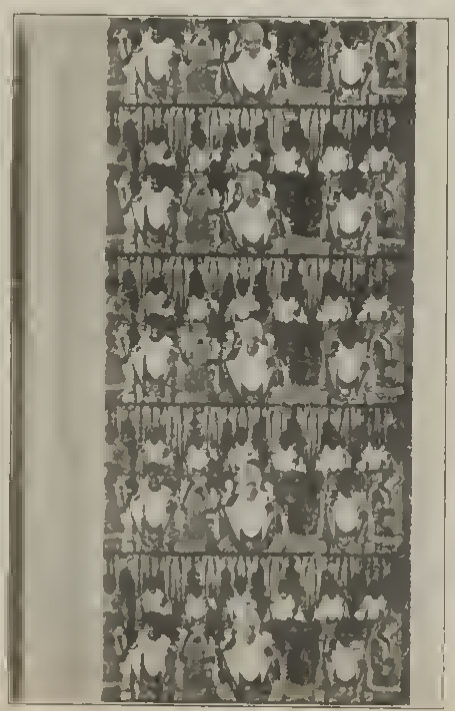
Grandeur is the trade name of the wide film standard adopted by the Fox Film Company The width of the film itself is 70 millimetres while the frame is 22½ mm x 48 mm leaving a sound track 7 mm wide in the customary position at the left of the picture

Grandeur film-stock is no different from the normal 35 mm stock save that it is cut in wider strips, and that the perforations are of a slightly different pitch At present the Eastman Kodak Company is the only firm manufacturing *Grandeur* negative and positive stock This is due largely to the fact that the only existing *Grandeur* perforators are located in their plant These are actually the property of the Fox Corp but have been located there for convenience however the Rochester organization has lately installed several additional perforators for their own use as the output of the original pair has become insufficient to supply the demand for *Grandeur* film Aside from the matter of perforation the manufacture of *Grandeur* stock differs not at all from that of ordinary film the only difference being that the alternate knives are removed from a standard slitting machine to cut the large sheet of emulsion coated celluloid into 70 mm strips instead of 35 mm ones The price is exactly twice that of 35 mm

The cameras used in *Grandeur* are also available on the open market today They are made by the Mitchell Camera Corp and are simply the standard Mitchell Sound Cameras enlarged laterally to accommodate the wider film Wherever possible the parts are interchangeable with those of the standard 35 mm Mitchells and the design has been such that this is possible in a surprisingly large number of cases Probably the outstanding changes are in the shutter which of course had to be made practically double the size of the old one, and in the actual film moving mechanism The pitch of the *Grandeur Mitchell* are cut somewhat differently as the pitch of the *Grandeur* perforations is approximately [illegible] against a pitch of .187″ for the standard 35 mm In every other respect the 70 mm Mitchell is identical with the latest 35 mm designs and is therefore no different to operate Special *Grandeur* lenses having a greater angular covering-power are of course used According to Mr George Mitchell there are now more than fifteen *Grandeur* cameras completed and in active use while a hundred more are in process of manufacture

The only laboratories as yet equipped to handle the processing of *Grandeur* film are those of the Fox Corporation itself These are now crowded to capacity in handling the daily work of the company and the production of *Grandeur* release prints The general policy of the commercial laboratories of Hollywood such as the Consolidated Film Industries and Roy Davidge s is one of waiting they can now by merely altering the spools on their developing machines accommodate *Grandeur* for development but since the matter of printing involves the acquisition of an entirely new battery of printing machines prudence dictates delay until the industry reaches a definite standard None the less the former firm states that they could on less than two weeks notice be prepared to handle such business if a definite demand arose

Grandeur projectors are now being manufactured in quantity by the International Projector Corporation who are reported to have more than 1 000 of their new 70 mm Super Simplex Projectors in work and who are making deliveries as speedily as possible Many of the major theatres of the Fox Circuit are being equipped for *Grandeur* and all of them will be in the near future



[illegible] Days

In the mean time *Grandeur* production is rapidly progressing at the Fox Hollywood Studios Parts of a number of recent Fox films have been experimentally filmed in *Grandeur* and the first all *Grandeur* picture *Happy Days* has been completed and release prints are now being made of it In addition several of the other pictures now in production or soon scheduled are being made in *Grandeur* as well as in 35 mm and tests have been made in combining *Grandeur* with the lately announced *Fox* [illegible]

Now what advantages does *Grandeur* offer to offset the tremendous disadvantages of a change in the established standard of the industry?

In the first place the present standard film and proportions were arrived at as Mr Carl Gregory pointed out before the last S M P I convention purely by chance being largely due to the coincidence that the standards

(Continued on Page 42)

MOTION PICTURE SOUND RECORDING WESTERN ELECTRIC METHOD

A Paper Included in the Technical Digest of the Academy of Motion Picture Arts and Sciences

By DR. DONALD MACKENZIE

Research Engineer, Electrical Research Products, Inc.

THE object of all recording is to furnish a sound which would be indistinguishable from the sound one would get from the real source if it were there At best it will be no better than direct transmission from the microphone which picked it up in the set, out to the horn which reproduces it in the theatre From the point at which the recording device comes in to the point where the photocell furnishes current for the amplifier we have done nothing but introduce a delay circuit to stop the currents coming from the microphones and store them up until we want them to actuate a loud speaker You will see that the permanent record will be nothing more than a delay circuit The effort to give a complete illusion then, is dependent upon the success of the transmission line and it is affected with all of the disadvantages of listening with one ear (one microphone) whereas you have two ears The acoustical conditions which are favorable and give a fair illusion are discussed by Mr Maxfield

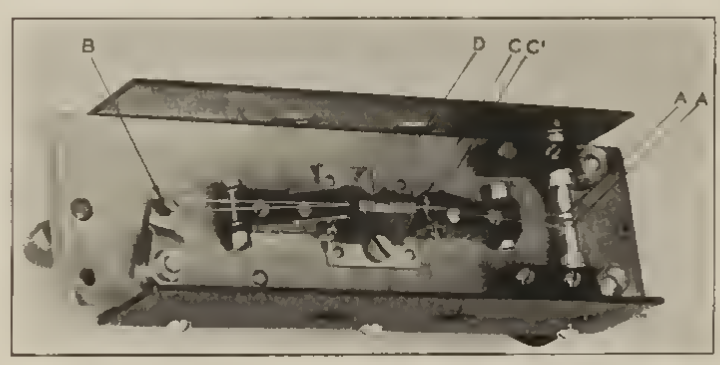


Figure 1

The recording method I wish to describe is used in the Western Electric system and depends upon the light valve to effect modulation of the light on the sound negative

The Photophone method described by Mr Townsend is a variable area method The method Mr Hansen described is a variable density method and I am about to discuss another variable density method In Mr Hansen's device we have a light source, whose intensity is varied shining on the film through a slit of fixed width The factors of intensity and time constitute the exposure and one or the other is varied In the Fox device, the intensity is varied and the time of exposure is constant In the light valve shown in Fig 1 you have a shutter opening and closing That shutter is focussed on the film to form a line ½ mil wide when undisturbed and varying from zero to twice its normal width The intensity of the light is unchanged A fixed source of light shines upon a loop the sides of which open width of the image and close and the as it varies from zero to one mil varies the time it takes for the film to pass the exposure point

Fig. 1 shows a photograph of the light valve, invented in 1922 by E C Wente of the Bell Telephone Laboratories Essentially it consists of a loop of duralumin tape suspended in a plane at right angles to a magnetic field The tape, 6 mils wide and 0 5 mil thick is secured to windlasses A and A¹ and stretched tight by the spring held pulley B At points C and C¹ insulated pincers confine the central portions of the tape between windlasses and pulley to form a slit 1 mil wide Supporting this loop and adjusting devices is a slab of metal with central elevation D, which constitutes the armature of an electromagnet The central portions of the loop are supported on insulating bridges to lie 3 mils above the face of D, here the sides of the loop are centered over a tapered slot, 8 mils wide by 256 mils long in this plane, opening to 204 mils by 256 mils at the outside face of the armature Viewed against the light the valve appears as a slit 1 mil by 256 mils

The electromagnet core has a similar elevation opposing D across an air gap of 8 mils which closes to 7 mils when the magnet is energized from a 12 volt battery A tapered slot in the magnet core begins 8 mils wide by 256 mils long and opens with the same taper as the slot in the armature When the assembly of magnet and armature is complete the valve constitutes a slit 1 mil by 256 mils its sides lying in a plane at right angles to the lines of force and approximately centered in the air gap The windlasses A and A¹ one of which is grounded are connected to the output terminals of the recording amplifier If the magnet is energized and the amplifier supplies current from an oscillator the duralumin loop opens and closes in accordance with the current alterations Length and tension of the vibrating part are so chosen that its resonance is at 8500 cycles which puts it out of the range of the conspicuous cycles in speech and music

If this appliance is interposed between a light source and a photographic film we have a camera shutter of unconven

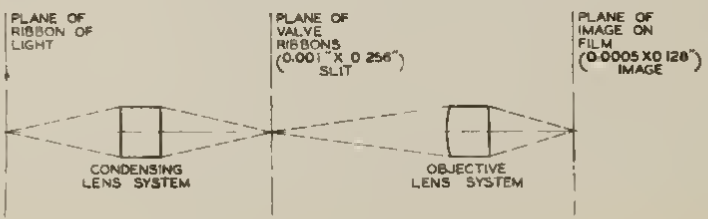

PLANE OF RIBBON OF LIGHT
PLANE OF VALVE RIBBONS (0.001" X 0.256") SLIT
PLANE OF IMAGE ON FILM (0.0005 X 0.120") IMAGE
CONDENSING LENS SYSTEM
OBJECTIVE LENS SYSTEM

DIAGRAM OF OPTICAL SYSTEM IN STUDIO RECORDING

Figure

tional design. Fig. 2 shows a diagram of the optical system for studio recording. At the left is a light source, a ribbon filament 18 ampere projection lamp which is focussed on the plane of the valve. The light passed by the valve is then focussed with a 2 to 1 reduction on the photographic film at the right. A simple achromat is used to form the image of the filament at the valve plane, but a more complicated lens designed to exacting specifications by Bausch and Lomb is required for focussing the valve on the film. The undisturbed valve opening appears on the film as a line ½ mil by 128 mils in length at right angles to the direction of film travel. The width of this line varies with the second currents supplied to the vave, so that the film receives a varying exposure of light of fixed specific intensity through a varying slit.

Both the aeo light and the light-valve result in variable density records, and the transmission of the positive print at every point should be proportional to the exposure of the negative at the corresponding point. If that can be accomplished then we deliver to the photoelectric cell a light the same as it would receive had there been no record interposed.

Fig. 3 shows a studio recording machine with the door of the exposure chamber open. In this machine the film travels at 90 feet per minute, and the sound track is made at the edge away from the observer. The line of light the image of the valve overruns the perforations by 6 mils, extending toward the center of the film 122 mils inside of the perforation line. The right-hand sprocket serves to draw film from the feed magazine above and to feed it to the take-up magazine below. this sprocket is driven from the motor shaft through a worm and worm wheel. The left hand sprocket engages 20 perforations and is driven through a mechanical filter from a worm and worm wheel similar to that driving the feed sprocket. The mechanical filter enforces uniform angular velocity of the left hand sprocket which carries the film past the line of exposure, the focussed image of the valve. Balancing of the flywheel which forms part of this mechanical filter holds the angular velocity constant to one tenth of one per cent despite the imperfections of the driving gears.

In Fig. 3 the photograph shows a photoelectric cell mounted inside the left-hand sprocket which carries the film past the line of exposure. Fresh film transmits some 4 per cent of the light falling on it and modulation of this light during the record is appreciated by the cell inside the sprocket. This cell is connected to a preliminary amplifier mounted below the exposure chamber and with suitable further amplification the operator may hear from the loud speaker the record as it is actually being shot on the film. Full modulation of the valve implies complete closing of the slit by one side of the wave of current. this modulation should not be exceeded or photographic overload will abound.

It is my purpose here to describe the procedure necessary to render the film as nearly perfect as possible, and produce a satisfactory delay circuit. We ask of the film or any other recording device that it should take the current fed to it and reproduce that without distortion. By that is meant that all of the currents which come up should be reproduced without omission and without changing the relative proportions of the currents that no other currents due to distortion of wave shape no frequencies other than those in the original sound source should appear in the reproduced record and there should be no static or noise— ground noise on the film or surface noise on the disc.

At the microphone you pick up whatever noise there is on the set in addition to the signal. If the cameras are noisy, if the population on the set is noisy such noises will appear as contributing to the ground noise although they are not due to the recording itself. There is some noise in amplification and often some cross-talk due to pick up from neighboring circuits this may be called system noise. Set noise is the most important and system noise may be reduced to nearly nothing by careful maintenance. The noise from the film when carefully processed is small in comparison to the others I have mentioned.

Obviously some sounds will be recorded but lost in the ground noise of the system and film. There will be other sounds which will overload the valve. How wide a difference in level can be recorded and reproduced without distortion on the one hand and without being lost in the ground noise on the other? As a matter of fact under experimental conditions with everything in our favor records were made in 1925 at the Bell Telephone Laboratories, of the Capitol Theatre Orchestra in New York with a range of 60 d b between the loudest peak and the ground noise. In that case the theatre noise itself determined the lower level. Sixty decibels is a much narrower range than you can hear between the threshold of audibility and the threshold of feeling. But the noise heard by the audience is never zero because the noises in the theatre—the ventilating system the breathing and involuntary shifting of the audience—are always well above the threshold. If you were able to record in every case a range of 60 decibels you would satisfy almost all requirements of recording. We do not record that except under the most favorable circumstances so far but we can claim that the range of 40 decibels is commercially to be expected for careful work between the overloading signal and the ground noise. 40 decibels between the ground noise and the overloading signal means you can easily record the range of 30 decibels between fortissimo and pianissimo and keep the pianissimo free from noise. That is the range between a whisper and a yell.

The success of our efforts to reduce the ground noise due to the film record itself is dependent upon our preventing parasite modulation of exposure such as would be caused by light reflected from the sprocket teeth which move the film past the exposure line and in avoiding local variations in density of the negative or of the positive print, due to irregular development or

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PRINCIPLES AND PROCESSES OF PHOTOGRAPHY IN NATURAL COLORS

Final Installment of Discussion of Color Photography

By GLENN E MATTHEWS
Kodak Research Laboratories Rochester N Y

PROCESSES of still photography always lack one important characteristic — motion for life as the eyes see it is associated closely with movement This fact led several investigators about 1890 to attempt to reproduce motion by means of photography As we know today, a standard motion picture film consists of a series of slightly differing pictures (1 inch wide by $\frac{3}{4}$ inch high) printed on a narrow film strip 16 pictures to each foot of film When intermittently projected at a rate of one foot or more per second the eyes by persistence of vision see these images gradually dissolving one into another because the impression of one picture does not quite disappear before the succeeding one overlaps it

Light [illegible] A [illegible] mera and projector

A Color Transparencies

1 Additive Motion Picture Processes

(a) Three Color Methods Soon after motion pictures were introduced attempts were made to perfect a color process of cinematography One of the earliest tri color additive methods was worked out in England by W Friese Greene It consisted in taking the pictures successively on a single film strip through primary filters incorporated in a rotating sector wheel and reconstructing them by projection in a similar manner through color filters It was found however that a projection speed of 70 pictures per second was necessary which proved entirely impractical because of the excessive wear on the machine and the film To reduce this abnormal speed the pictures were taken at normal speed simultaneously through three lenses on three separate films and projected in much the same way This method had its drawbacks also since three times as much film was required and optical errors were introduced which made it impossible to superimpose exactly pictures taken from different points of view and at different time intervals These are known as *parallax* and *fringing* errors respectively

Gaumont tried to overcome the need of using extra film by making the three records simultaneously on one film and reducing the size of the records so that they occupied $2\frac{1}{4}$ times instead of 3 times the space of a standard picture Both the camera and the projector were equipped with a special three-lens projection system, and the three primary filters were placed in front of the lens on the camera and the projector The results given by this process were very pleasing, but it had the objection that special equipment was required for showing the pictures and it also used more film than standard motion picture photography

In most all of the three color additive processes the film is moved intermittently but J Szczepanik designed a complicated camera and projection about 1925 in each of which the film is moved continuously Intermittent motion is dispensed with in the camera by having an endless chain of 18 lenses moving synchronously with the film behind a columnating lens three pictures being exposed at any time through primary filters The projector is even more complicated and reference should be made to the literature for details of its construction

Natural color motion pictures for the amateur became available in 1928 when Kodacolor film was announced for use in 16 mm equipment distributed by the Eastman Kodak Company The method is a commercial expansion of a process worked out in principle by R Berthon and A Keller-Dorian of France,

(Continued on Page 26)

Figure 16 [illegible] Kodacolor film of Child with red hat against blue sky and enlargements [illegible] line composition Note displacement of lines in hat area (A) compared with sky area (B)

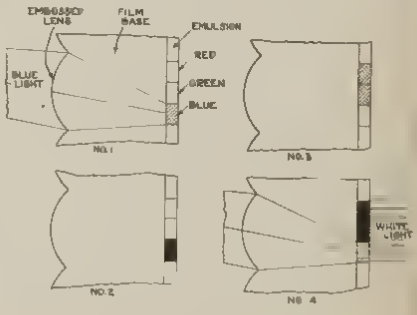

Figure 15—Action of blue light on single lens element of Kodacolor film

SOME PROPERTIES OF FIXING BATHS

Part Three of an Unusually Interesting and Informative Paper Presented at Spring Meeting of S. M. P. E. at New York City, May 6-9, 1929

By J. I. CRABTREE and H. A. HARTT

(This paper which is Communication No 396 from the Kodak Research Laboratories Rochester N Y has been published in three parts Readers who may have missed the other installments may secure back copies —*Ed Note*)

WHEN Should a Fixing Bath be Revived? The frequency of revival or the stage of exhaustion at which the revival should take place depends upon the following factors

(a) The original acidity of the bath, and

(b) The degree of uniformity of hardening required

(a) As stated previously a large quantity of free acid in a fixing bath is desirable on the one hand because this increases the developer capacity, but it is also undesirable because the propensity of the bath to blister and precipitate sulfur is increased while the hardening properties of the bath are impaired If maxtmum hardening and sulfurization life are required, a minimum quantity of acid should be used but this will necessitate very frequent revivals with acid If revival is not possible or undestrable then the largest quantitty of acid which will give the desired hardening and sulfurizatton life should be used though experiments have shown that the best formula which it is possible to compound is inefficient unless revived because the bath will precipitate aluminium sulfite long before the fixing powers of the hypo are exhausted

It was considered that it might be possible to employ a high original acidity by suitable buffeting of the acidity as suggested by F A Elliott (U S Patent 1 411,6871 but it has been shown by practical experiments that although certain buffer salts such as sodtum acetate tend to maintain the hardening properties and sulfurization life they do not materially decrease the propensity of the bath to blister and are therefore of correspondingly less practical value

(b) From Fig 8 it is seen that as a fixing bath becomes exhausted the hardening increases up to the point at which aluminium sulfite precipttates and then decreases so that the best point at which to revive with acid would be that just previous to the precipitatton It is dangerous however to approach the precipitation point too closely because once the alumtntum sulfite has precipitated, a relatively large quantity of acid must be added to bring it back into solution the balance of the bath is destroyed and it is liable to cause blisters If the quantity of acid permissible for satisfactory hardening is added the precipitate disappears very slowly and it is necessary to revive at such a time when it is possible to allow the bath to stand for a day or two in order to dissolve the precipttate completely

The effect of reviving a bath with varying quantitres of acid at different stages before the aluminium sulfite precipitation point is shown in Figs 9 and 10 These curves were obtained from results of tests made under practical working conditions in a motion picture finishing plant and are considered to represent average working conditions The properties of tehe baths were tested only before and after revival, and therefore straight lines were drawn between the points representing the properties of the bath at the time of the tests

The acidity hardening sulfurization life, and developer capacity curves have all been assembled in one figure and the respecttve data are given for each stage of exhaustion determined by a definite number of feet of motion picture film fixed in the bath

Test A (Fig 9) represents the properties of a bath revived with too much acid at too infrequent intervals, while test B (Fig 10) represents a more satisfactory method of revival where a smaller quantity of acid was added at more frequent intervals The results indicate that there is a greater variation in the properties of the bath in test A than in the case of test B In both cases the acidity was maintained within satisfactory limits while the relative hardening varied from 90° to 160° (M P °F) in test A and from 120° to 155° (M P °F) in test B The sulfurization life varied in test A from one-half day to six days and in test B from one day to six days It is considered that a fixing bath which precipitates sulfur in one half day at 115°F should not be stored for too long a period at room temperature before use because the propensity to precipitate sulfur is too great The developer capacity varied from 2% to 10% MQ25 for test A and from 4% to 10% MQ25 in test B It is considered that a bath which requires only 2% MQ25 to precipitate aluminium sulfite at normal temperature is too near the point of precipitation to be satisfactory for further use because of the propensity to precipitate a scum on the surface of the film If the fixing bath had not been revived a precipitate of aluminium sulfite would normally have occurred after about 17 500 feet of film had been fixed per 50 gallons By reviving as above the life was prolonged to 30 000 feet

It is also apparent that the properties of the fixing bath remain more nearly uniform with frequent revivals using smaller quantities of acid If the bath had been revived at sufficiently frequent intervals the various curves would tend

to approximate a straight line from the fresh to the exhausted bath. However, it was concluded that revival with acid in the proportion of 1 pint (500 c c) per 120 gallons of bath after processing 7,500 feet of film was sufficient to prevent the bath from becoming impaired with regard to the propensity of the bath to precipitate aluminium sulfite and that the acid necessary to restore the properties of the bath and maintain satisfactory developer life until the next revival was not sufficient to impair the hardening properties and sulfurization life of the bath. It was also concluded that practical procedure in a motion picture laboratory would not warrant more frequent revival because of the time and delay accompanying such procedures.

3. Methods of Determining the Revival Point.—(a) As outlined above, the revival point or stage of exhaustion at which the bath should be revived is largely arbitrary, depending upon the degree of uniformity of hardening desired; that is for more uniform hardening the bath should be revived at frequent intervals although in practice it is usually satisfactory if revival takes place just previous to the point at which aluminium sulfite is precipitated.

At the outset it was thought that it might be possible to add to the bath an acid indicator which would change color just previous to the point at which precipitation of aluminium sulfite occurs; although the color of the indicator either in the fresh or exhausted bath would have to be complementary to the safelights used in order to permit of detection of the color change in the darkroom. No perfectly satisfactory indicators for the purpose are at present known.

(b) It is possible to determine the quantity of sodium sulfite and sodium carbonate added to the fixing bath during the process of fixation by titrating the fixing bath with a known alkali using suitable indicators. From this information the quantity of acid necessary to bring the bath back to its initial stable condition can be calculated. However, in order to determine this it would not only be necessary to consult the curves for the compounding of a fixing bath but it would also be necessary to determine the effect of the exhaustion products from the other curves indicated above. This would complicate the procedure to such an extent that it would not be applicable to average darkroom procedures.

(c) Since none of the above methods is readily adaptable for darkroom use the only alternative was to determine the period of revival by means of a quantity factor. Every darkroom worker knows, or should know, roughly the footage of film treated which has carried over a definite volume of developer to the fixing bath, assuming a constant period of drainage or rinsing between developing and fixing. Usually only one developer is used in connection with any fixing bath, but in case different developers are used, containing varying quantities of alkali, a slight correction factor should be used. The quantity of film fixed is therefore a measure of the quantity of developer added to the fixing bath and therefore of the degree of exhaustion.

The point at which the revival should be made should be selected as outlined above. On an average it is advisable to revive at the half-way stage towards the sludging point. By experience the quantity of film necessary to cause a precipitate of aluminium sulfite is known and the bath should be revived when half this quantity has been treated. Thus, in the case of motion picture film if it requires 15,000 feet of film under given conditions to cause a precipitate with say, 50 gallons of fixing bath revival should take place after treating 7 500 feet of film.

4. The Quantity of Acid to be Added at Each Revival.—As seen from Figs. 3, 4 and 5 it is necessary to increase the concentration of the acid as the concentration of the sulfite is increased in order to render the bath stable with regard to the precipitation of aluminium sulfite and for this reason it is apparent that the total acidity of a revived bath should be slightly higher than the acidity of the fresh bath in the first place. This increase in acidity cannot be definitely determined but depends upon the procedure as followed by the individual worker because various procedures permit the carrying over of varying quantities of developer into the fixing bath, depending upon the concentration of the developer and the period of rinse between development and fixation.

IX. Summary

1. A criterion for the comparison of various fixing baths has been developed and includes a consideration of (a) the time of fixation, (b) the degree of hardening produced, (c) the sulfurization life, (d) the developer capacity or the quantity of developer which can be added before a precipitate of aluminium sulfite is produced, (e) the propensity to blister, and (f) cost.

2. A series of arbitrary tests has been devised whereby it is possible to determine the merits of any particular fixing bath with relation to the criterion as outlined above.

3. For fixing Eastman negative motion picture film a 40% solution of hypo is most efficient and for Eastman positive motion picture film a 25% solution gives maximum efficiency. When a bath is used for both negative and positive film, a concentration of 30% is satisfactory.

4. The hardening produced by potassium alum solutions of various concentrations is affected by the addition of acetic acid and sodium sulfite. For a given quantity of alum and acid the hardening increases to a maximum on the addition of sodium sulfite then diminishes and finally a precipitate of aluminium sulfite is formed. With fixed concentrations of alum and sodium sulfite the hardening decreases as the acid concentration is increased.

From a series of curves showing the effect of variation in the proportions of alum, sulfite and acid on the sulfurization and hardening life and the tendency of the bath to precipitate aluminium sulfite it is possible to compound fixing baths having any desired properties.

5. Sodium sulfite may be replaced by sodium acetate in a fixing bath but sodium acetate is only one-fifth as efficient as sodium sulfite as a sulfurization inhibitor.

6. In certain cases, the acidity of a potassium alum fixing bath cannot be sufficient to keep the bath clear during the addition of a large quantity of developer because the acidity is limited by the propensity of the bath to blister and sulfurize. Under certain conditions where the efficiency of the fixing bath is determined by the quantity of developer which may be added before aluminium sulfite is precipitated, it has been shown that the addition of acid at frequent intervals during exhaustion of the bath is a material advantage.

X. Practical Recommendations

In motion picture work the nature of the most satisfactory fixing bath to be used depends on the particular photographic procedure adopted. For instance, if an acid stop bath is used after developing, high acidity of the fixing bath is not necessary, while if both rapid fixation and excessive hardening are desired the fixing bath must harden more rapidly than if a longer time of fixation were permissible.

It is not absolutely necessary to harden the gelatin coating of motion picture film, but a hardened negative film has a less propensity to become finger marked during handling while with positive film hardening during fixation is desirable because (a) this permits more rapid drying of the film, (b) if the film is developed by the rack system the hardened gelatin coating is less liable to be abraded when wiping the film during transference to the drying reel,* and (c) if the film is relatively moist during projection there is less tendency for the film if hardened to stick in the projector gate.

Non hardening Fixing Baths

If the temperature of the various developing solutions can be maintained at a temperature not higher than 65°F and if ample drying time is allowed so that relatively cool drying air can be used the following non-hardening fixing bath is satisfactory:

	Metric	Avoirdupois
Hypo	250 grams	100 lbs
Sodium sulfite (desiccated)	10 grams	4 lbs
Sodium bi-sulfite	25 grams	10 lbs
Water to make	1 liter	50 gallons

The bi-sulfite serves to keep the bath acid and prevents stains while the sulfite prevents precipitation of sulfur if the bath is stored previous to use at too high a temperature. The bath should be maintained acid by reviving with a 25% solution of sodium bi-sulfite at intervals or in the case of machine processing by allowing this reviving solution to flow into the tank continuously during use.

An alternative method of revival consists in passing sulfur dioxide gas into the bath. Although this method is efficient in practice there is danger of accidental escape of the suffocating gas into the atmosphere of the laboratory.

Acid Hardening Fixing Baths

In most cases it is desirable to harden motion picture film to a moderate degree during processing and a satisfactory acid hardening fixing bath for both negative and positive motion picture film should possess the following properties:

(a) The melting point of the fixed-out film should range from 120° to 160°F.

(b) If the sulfurization life of the bath is one and one half days at 115°F the bath will keep satisfactorily for about three weeks at 70°F. which is ample for most purposes.

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GETTING ON IN THE WORLD

The Ability to Play a Flute Landed Glenn Kershner in Hollywood as a Cinematographer

By HAL HALL

A LANTERN JAWLD policeman was crossing the Williamsburg bridge in New York some years ago Like most New York policemen he was taking his time and whistled merrily to himself as he gazed out over the magnificent view that lay before him Suddenly the whistle stopped and the policeman s face turned a sort of blue gray

Passing pedestrians might have been pardoned for thinking the policeman had suddenly gone crazy, for he started shaking his fist, apparently at the sky and shouting "Come down you d - - fool! Do you want to be killed!"

Then the crowd gathered for high up in a maze of cables and wires was the lone figure of a man crawling steadily toward the top of the highest span of this gigantic bridge A slip of the foot and the crowd knew that death was to be a visitor The crowd continued to gather and the man continued to climb He reached the top and, twining his legs around a tiny appearing cable, unstrapped a camera from his back and nonchalently started making pictures

When he reached the safety of the bridge again the officer was waiting for him with threats of matching him to the police station But when he discovered the man was a cameraman shooting motion pictures for the Henry Ford Educational news weekly—well he just said a few expressive words and the cameraman went about his way, unmolested

That cameraman was Glenn Kershner the man who draws the cartoons for the American Cinematographer magazine and who is a Cinematographer at First National's Hollywood studios and a member of the American Society of Cinematographers Kershner didn't think he had done anything to cause excitement To him climbing to the top of that bridge structure was just another job And perhaps you can get the best idea of this man Kershner from that little episode

Writing a yarn about Kershner is a difficult task for there is so much to write about He has done so much, is doing so much that one is very likely to wander trying to tell it all with the result that nothing is told

Kershner is one of the most interesting men you will meet in a lifetime Big jolly always laughing he is the soul of good natured hospitality and his home out in Culver City has never experienced the turning of a key in the lock If I recall correctly Glenn told me the key to both the front and back doors has been lost

Those misguided souls who think that the only interesting people to write about in the picture business are the stars should dig into the past of these cameramen Then they might discover the error of their ways There may be a few stars whose past is as colorful as Kershner's—but they are mighty few

Kershner is a cameraman by profession but among the other things that he does well are the following He is a sculptor of no mean ability He paints better than a lot of artists whose pictures now and then find their way into the salons He is a cartoonist as the readers of this magazine know from his work He plays the flute, the bass viol and the piccolo well enough to be classed as an artist His ability as a carpenter is brought out by the fact that he has rebuilt the entire interior of his home He could walk out any day and get a job as an expert mason That may seem peculiar when you think of his musical ability but his handiwork as a mason is evidenced by his work in building a great outdoor fireplace and patio where in the summer he stages corn roasts for his legion of friends

So that s that as far as his varied ability goes

Glenn was born in Findlay Ohio (when Glenn explains is nobody s business), and was slated to follow in the footsteps of his Dad who was in the oil business But Glenn had other ideas so he ran away from home when he was fifteen and tried to join the army but was turned down so with his brother made his way to Los Angeles

GLENN R KERSHNER

We had a tough time, says Glenn The matter of eating for a time was a problem But I discoveted that there was a way I could draw a bit and I had a still camera with me So I would draw decorative signs for a lunch wagon For the signs I would get a week's board Then I'd draw a set for another wagon and get my brother's board In this way we got along until the lunch wagons had all been decorated I took care of our tonsorial problems by photograpbing the shop of a barber for the price of eight dollars The barber wanted to give me an acre of ground out in what is now the Wilshire district of Los Angeles in place of the eight dollars I refused the ground and took it out in hair cuts But—the new Bullock s Wilshire store is now located right on that acre of ground "

Glenn tired of Los Angeles and returned to Ohio where he entered the Findlay Conservatory of Music to study the flute meanwhile helping pay the cost by playing nightly in the orchestra of a motion picture house and singing the illustrated songs For this he received the salary of twenty-five cents a night In a few weeks his salary was raised to five dollars a week, for he had become an attraction

Two years of this and Glenn's genius as a flute player landed him with an orchestra that traveled for a year throughout Canada and the middle west Then he played a year with the English Grand Opera singers Leaving this organization Glenn entered the University of Wisconsin determined to be-

(Continued on Page 40)

As the Editor Sees It

This and That

HOLLYWOOD has changed a lot from the days of not so long ago There was a time when on most any corner one could find at most any time persuasive men talking in terms of thousands explaining how next week when this release or that contract was signed they were prepared to produce a picture that would startle the world Today these street corner producers have vanished Perhaps it is the talkies with their great expense that have driven these fellows away Anyway there are fewer conversational pictures in Hollywood today than ever before

Talkies have brought much grief to the visitors, too There was a time when visitors in large numbers were allowed to step within the studio gates and watch their heroes or heroines go through their paces But alas, these days are no more Talkies with their demands for silence have made many a maiden or matron from the distant villages weep bitter tears for to get on a set now is a task that requires the brains of a Solomon

The Montmartre and the Brown Derby however prosper as a result of the banning of studio visitors At these two eating houses the visitor can still see the stars in persons And how the visitors do look.

An interesting town is this Hollywood Imagine having Jack Oakie bump into you so hard you almost fall down That's what happened to one pedestrian the other day as Jack dashed out of Henry's

Who was that?" asked the pedestrian And when she was told she almost fainted with joy Funny thing this hero worship

All For A Thrill

TEN men's life were lost last month while attempting to provide another thrill for a thrill mad public A director four cameramen, two pilots and four others All sacrificed on the altar of what?

Go to any theatre where an air picture is being shown You hear a gasp here and there Then from first one side then the other you hear loud whispers of 'Oh that's not real Those scenes were faked"

So after all, why risk good men's lives providing thrills when they can be provided by trickery? A large part of the public does not appreciate the danger does not appreciate the fact that men have risked their lives making the shots which are so often called fakes Ten Hollywood homes are sad today as a result of a shot that would flash on the screen for a few seconds and then would be gone and forgotten Is it worth the sacrifice and the danger?

The S. M. P. E. Journal

WITH THE appearance last month of the new monthly journal of the Society of Motion Picture Engineers, the motion picture industry was enriched by a publication that should be one of the greatest sources of real technical information of the industry The American Society of Cinematographers and the American Cinematographer Magazine take this opportunity to congratulate the members of the S M P E upon the new Journal and wish it all the success it deserves and that is much

This Journal should play a prominent part in the engineering problems of the picture industry, and judging from the first issue, it will fill its place admirably One of the outstanding characteristics of the S M P E is its stimulation of ideas in the industry. This Journal will aid in this stimulation and should be of untold worth

Mr. L A Jones Editor pro tem is to be congratulated upon the appearance of the first issue He has made a wise choice of papers every one of which is not only timely and interesting but is a real contribution of practical ideas If the first issue is a criterion, we may expect a wealth of valuable matter in the years to come and we hope that the Journal will receive the support it so well deserves

"Uncle Carl"

LAST MONTH Carl Laemlle president of Universal Pictures celebrated his sixty-third birthday Congratulations poured in from all quarters of the globe

Uncle Carl as he is known on the Universal lot celebrated as it were by retiring two and a half million dollars worth of notes that fell due And he did it without any further public financing Quite a feat for any organization

'Uncle Carl' is to be congratulated not only on his having reached sixty three but upon his success as an independent and individualistic business man He has stood throughout the past fifteen years on his own feet, has gone his own way, and as his organization reaches its fifteenth anniversary of its location at Universal City, we take pleasure in wishing this man—who landed in America in 1885 with only fifty dollars—many more years of success and happiness

Talkies

THE WORLD and his wife delight in taking pot shots at Hollywood and its motion picture makers The chief indoor sport of most writers seems to be ridiculing the brains of Hollywood

However is there another industry that can point to such tremendous advancement as the picture industry has made in the short time talking pictures have been in existence? A new and strange art has been taken up by the picture makers and when you see and hear such pictures as M G M's Rogue Song you suddenly realize that the picture makers have worked wonders

Cinematographic Annual

AS THIS issue of the *Cinematographer* goes to press the preparation of the Cinematographic Annual is rapidly being completed And we whisper right now that a real treat is in store for those who secure this book

The American Society of Cinematographers is a society made up of the greatest cameramen in the world They have put the same careful and painstaking effort into the preparation of this book that they put into their pictures The result is going to be even greater than they had hoped for

A list of the contributors to this volume reads like the 'Who's Who' of the technical world This book will be the first real textbook ever turned out in the motion picture industry dealing with the outstanding technical problems Truly no man interested in cinematography sound projection theatres laboratory work, studio problems or any of the other technical activities can afford to miss this book

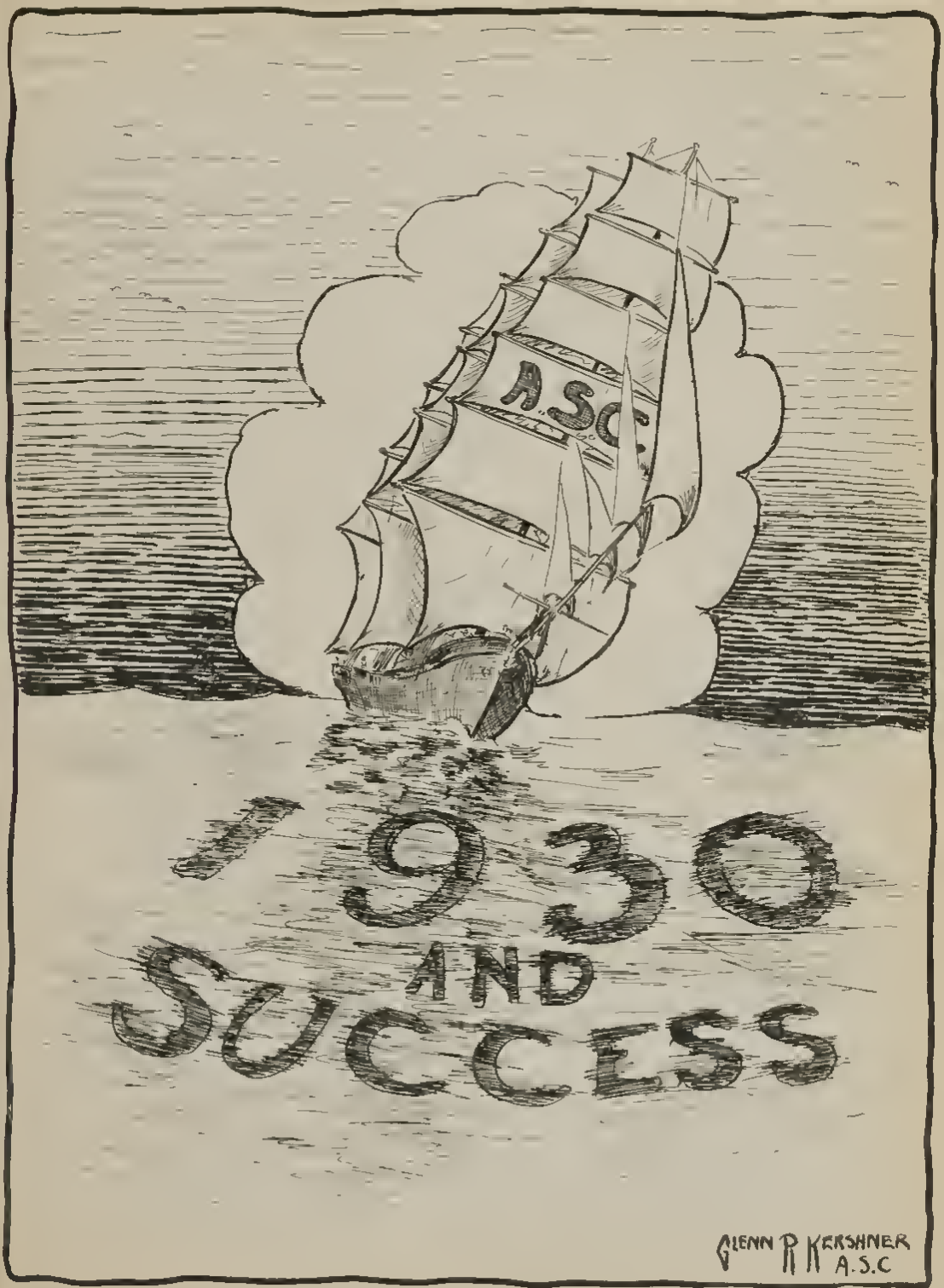
Pictures vs. Stage

IF THE motion picture producers continue turning out such pretentious pictures as they are giving us at present there will soon be little need for the big musical extravaganzas of Broadway Metro-Goldwyn-Mayer's Rogue Song and First National's 'Sally surely exceed the stage presentations from the point of view of gorgeousness and as the sound is reaching perfection the screen will be able to present a much finer show than could be given on any stage

The great Tibbett in the 'Rogue Song' has caught the public fancy and gives a performance that is superb Those who handled the sound on this picture are to be congratulated for they have given the public the finest that has yet appeared While Tibbett is wonderful in this picture, let us hope that M-G-M officials will make us wait a while for his next one That makes one desire to see a star all the more Chaplin has the right idea when he makes his screen appearances so seldom

Wide Film

WIDE FILM apparently is soon to be a reality, despite all the doubts expressed and obstacles discussed Fox is in production is soon to present 'Happy Days' on seventy millimetre Announcement has been made of cameras and other equipment for the wide film Apparently wide film will take its place beside color soon


A.S.C.
1930
AND
SUCCESS
GLENN R. KERSHNER
A.S.C

Fixing Baths

(Continued from Page 14)

(c) The developer capacity should be such that at least 3% of MQ25 developer can be added before a precipitate of aluminium sulfite is formed This capacity is considered adequate especially if the bath is revived at intervals with acid

On reference to Fig 4 it is seen that the following formula possesses the above properties and in practice this formula has been found to be entirely satisfactory

Fixing Bath (Formula F 2)

	Metric	Avoirdupois
Hypo	240 grams*	100 lbs
Water to make	1 liter	50 gallons

Add 50 c.c. per liter or 2½ gallons per 50 gallons of the following Stock Hardener

Stock Hardening Solution (Formula F-2a)

Sodium sulfite (desiccated)	60 grams	25 lbs
Acetic acid (glacial)**	100 c c	5 gallons
Powdered potassium alum	120 grams	50 lbs
Water to make	1 liter	50 gallons

**Use 3½ times the quantity if 28% acetic acid is used

The hardening solution should be prepared separately and added to the cooled hypo solution as required To prepare the hardener, dissolve the sulfite and alum separately add the acid to the sulfite solution and then add the alum solution adding water to make the required volume Do not add the sulfite to the alum solution before adding the acid or a precipitate will form "

When the hardener is stored a white incrustation of basic aluminium acetate tends to precipitate out on the walls of the container but this does not impair the hardening properties of the solution During storage in an open crock it is important to use a floating cover consisting of a sheet of thin Kodaloid in order to prevent loss of sulfur dioxide and oxidation of the sulfite by the air otherwise in the absence of the necessary sulfite the hardener will cause the bath to sulfurize

*The concentration of hypo to be used may be varied to satisfy individual requirements

1 Temperature of the Fixing Bath—Under normal conditions the bath should be maintained at a temperature between 65° to 70°F. for most efficient fixation If the temperature is higher than this the gelatin is liable to soften before the hardening materials have been able to harden the gelatin sufficiently to withstand a higher temperature while if the bath is below 65°F the rate of fixation is impaired and maximum efficiency is not obtained

2 Time of Fixation The times required to clear the emulsion of positive and negative motion picture film at 65°F with and without agitation' during the active life of the bath (rack and tank method) are shown in Table IV The bath was revived with acid at intervals but of course was continuously diluted by the water carried over by the racks from the rinse bath.

The time of fixation with agitation may be taken as a rough measure of the times for fixing with machine development Recent experiments have shown that the emulsion is fixed out when all signs of opalescence of the film have disappeared so that for all practical purposes the film is fixed as soon as it clears However with most hardening fixing baths a slight opalescence of the gelatin persists even after thorough fixation and washing but invariably disappears on drying It is good practice therefore to invariably fix the film for at least twice the time required to appreciably clear the emulsion

3 Degree of Hardening Produced The Melting point of positive motion picture film ranges from 120° to 160°F throughout the active life of the bath when revived at intervals with acid as shown in Table IV After each revival with acid the degree of hardening rises from 20 to 30 degrees and gradually drops again as the bath is used and more developer is carried into the bath by the film In this case the bath was on the verge of sludging at the revival point so that the hardening increased on the addition of acid In the case of the curves shown in Figs 9 and 10 the hardening decreased on revival with acid because the bath was much more remote from the sludging point at each revival The hardening curve for a fixing bath used in conjunction with the Eastman borax developer" (which contains a high concentration of sulfite) is somewhat different Since the addition of an excess of sulfite to a fixing bath lowers the degree of hardening (Fig 4) it is seen that if the negative film is not rinsed in water and allowed to fix without agitation this produces in effect a fixing bath having a high concentration of sulfite in the gelatin layer whose hardening properties are at a minimum It is very important therefore in the case of film developed in the Eastman borax developer, to agitate thoroughly on first immersing in the fixing bath otherwise little or no hardening will be produced and reticulation is likely to occur in hot weather With machine development the agitation is adequate Hardening data for the above bath during use when fixing negative film developed in the Eastman borax developer with agitation are shown in Table IV

4 Revival of the Bath with Acid An alum hardening fixing bath is usually rendered useless as a result of the formation of a precipitate of aluminium sulfite long before the fixing properties of the hypo are exhausted A fixing bath can however, be revived successfully at intervals by adding a definite quantity of acetic acid It has been found best to add 500 c.c or one pint of glacial acetic acid after every 7,500 feet of film (positive and negative) are processed in 120 gallons of the bath If more acid than the quantity recommended is added, blisters and sulfurization are liable to occur.

These figures refer only to the above fixing bath (formula F-2) when using either developer formula D-16 or the Eastman borax formula D-76 and rinsing thoroughly in water after development With developers containing more or less alkali or sulfite than these developers the quantity of acid added should be adjusted accordingly.

If a footage record of the film processed is not kept the acidity of the bath should be tested by titrating with alkali, using phenolphthalein as indicator When the total acidity has dropped to two-thirds of the original acidity enough acid should be added to restore the original acidity The best way to revive a fixing bath would be to add acid gradually at a very slightly greater rate than that at which the acid is neutralized it having been found that with use the acidity of the fixing bath should be increased slightly in order to maintain its hardening properties However the method of revival by adding acid after treating a definite number of feet of film has been found to work very satisfactorily in practice and is to be recommended

If the bath has deposited a sludge of aluminium sulfite through neglect in reviving with acid, it is not advisable to try to dissolve this sludge by adding acid, although if the precipitate is freshly formed, it will usually dissolve after revival with acid on standing over night

5 Revival of Fixing Baths by the Addition of Hypo With use the rate of fixation falls off as a result of (a) removal of active thiosulfate ions by virtue of the formation of complex silver thiosulfate ions (b) dilution of the bath as a result of the addition of developer or rinse water and removal of thiosulfate by the films to the wash water, (c) accumulation of sodium iodide formed as a by-product in the conversion of the silver iodide in the emulsion to silver thiosulfate

It is quite possible to revive the bath at intervals by the addition of a concentrated solution (60% to 70%) of hypo and still retain the hardening properties The frequency of revival is determined by the limits of the permissible times of fixation and the actual quantity of hypo to add can only be ascertained by trial Under no circumstances should solid hypo be added to the bath because this may tend to cause sulfurization

With such revival the point at which the bath should be discarded is determined mainly by the propensity of the bath to stain the film

6 When to Discard the Bath In practice a fixing bath is discarded for one or more of the following reasons (a) the bath sulfurizes (b) a sludge of aluminium sulfite forms in the bath, (c) the bath becomes dark in color stains the film or froths excessively, and (d) the time of fixation is excessive

(a) The sulfurization life of the bath F-2 with use is shown in Fig 10 When freshly mixed a deposit of sulfur will commence to form after storing for one and one-half days at 115°F but with use the acid content decreases and more sulfite accumulates so that the sulfurization life rapidly increases to three days at the above temperature On revival with acid the sulfurization life drops again to one day so that when reviving with acid in warm weather when the temperature of the bath may be higher than normal, the acid should be added very slowly and the bath should be put to use within one or two days after revival Once the bath has deposited sulfur it is impossible to redissolve the precipitate and the bath should be thrown away

(b) If the bath is not revived with acid it will precipitate a sludge of aluminium sulfite after processing about two hundred feet of positive film per gallon although this precipitation point depends upon the alkali and sulfite content of the developer and the degree of rinsing between developing and fixing If the bath is revived with acid at intervals as recommended no sludging will occur

(c) After the bath becomes alkaline the developer carried over

(Continued on Page 30)

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Stengler, Chief Cinematographer On Inspiration's "Hell Harbor"

Mack Stengler A S C photographing a tense scene for "Hell Harbor" directed by Henry King

Stengler Chief Cinematographer On Inspiration's "Hell Harbor"

ALTHOUGH every shot was made in the United States all of Inspiration's "Hell Harbor," directed by Henry King as a starring vehicle for Jean Hersholt and Lupe Velez was photographed three thousand miles from a studio

Mark Stengler, A S C was chief Cinematographer on the picture and had a variety of experiences and difficulties running all the way from hunting locations at night only to find when the sun came up that he was all mixed up in direction to facing a real Florida hurricane which dumped a ship being used in the picture right up onto the shore

Director King did the unusual in making this picture when he shot all scenes down at Rocky Point Tampa Florida There the exteriors were shot Then sets were constructed and a street two blocks long was built with all the buildings and every shot was made there Shooting time was slightly more than ten weeks

The company was in the middle of the picture says Stengler when a hurricane made a visit A ship which was anchored out in the water was lifted onto the shore and broken into bits Some blow " said Stengler but not as bad as we often think "

Those who have seen the picture are loud in their praise of Stengler s cinematography The picture is all talking and will be released by United Artists

●●●

Technical Activities Centralized

TECHNICAL activities effecting the production branch of the motion picture industry will be centralized through Academy of Motion Picture Arts and Sciences, it is announced with the transfer to the Academy of the technical bureau which for the past two years has been maintained by the Association of Motion Picture Producers The facilities of the Academy will be continued and expanded as a clearing house for technical data and as the medium of cooperative research of non-competitive problems among the studios

"The transfer of the Association s technical bureau to the Academy recognizes a gradually expanding Academy program in the interest of and for the benefit of the motion picture industry as a whole," William C de Mille president of the academy, stated in the announcement

The Academy Board of Directors will administer the extended technical activities with the present joint committee from the Academy Producers' and Technicians' Branches as an operating nucleus This committee is now sponsoring acoustic classification of set materials the development of devices to silence the camera and the study of improved lighting for sound pictures Irving G Thalberg is chairman of the committee which includes Sol Wurtzel M C Levee Fred W Beetson Walter Stern Nugent H Slaughter H Keith Weeks William Sistrom H G Knox Frederick M Sammis, J T Reed J A Ball, Gerald F Rackett F E Pelton, Frank Woods and Lester Cowan

Formal transfer of the technical bureau followed a meeting of the Board of Directors of the Association of Motion Picture Producers Inc at which an initial appropriation of $15,000 a year was assigned towards the support of the Academy's augmented technical program

A research laboratory is not contemplated in the Academy's plans which will emphasize correlation of the work of the various present laboratories for maximum efficiency on problems facing the industry generally or common to a number of studios Standardization of materials and non-competitive processes will be furthered and the studios will be kept in direct touch with technical improvements effecting the industry

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New Projection Arcs

FROM THE research laboratories of the National Carbon Company at Cleveland Ohio comes word of the perfecting of a special carbon arc which it is claimed has 30 to 50 per cent greater brilliancy than the sun

Engineers of the company recently gave a demonstration in the laboratory of the International Projector Corporation in New York And the result according to the officials who viewed it, practically removed the last obstacle in the way of projecting wide film of stereoscopic motion pictures

For years the movie industry has been experimenting on a film giving the stereoscopic effect which would be shown on screens with an area two to three times as great as the present screen Sucressful projection of this film requires the use of more light than ever before used in motion picture projection Even the brilliancy of sun-light was insufficient for satisfactory projection on a screen of this area and the sources of illumination previously used fell far below this value Many attempts were made to produce a light of the required intensity and enormous sums were spent on these efforts The difficulties to be overcome at times seemed insurmountable

Cooperating with the manufarturers the engineers of National Carbon Company Inc claim to have perfected a super-high intensity carbon similar to those made by them for the most powerful government searchlight

The manufacture of this carbon requires from six to eight weeks So great is the care required that the raw materials are produced under careful technical supervision in a plant designed and built for that specific purpose The perfection of these carbons makes the exhibition of the wide stereoscopic film a certainty the engineers claim and it will be only a matter of a few weeks before they will be shown by several New York theatres

Measuring by Magic

View in shaper section of the Bell & Howell Engineering Development Laboratories where tomorrow's ideas and designs in motion picture equipment are created and executed

There are measurements in Bell & Howell cinemachinery so infinitesimal that no micrometer or other mechanical measuring device can readily define them. These measurements are made by optical projection, which, through great magnification, reproduces on the screen, in proportions visible to the eye, the spaces to be measured.

It may be asked by many: What is the need for this precision? But from the man behind the cameta to the man behind the projection machine, there is immediate comprehension. Producer, laboratory, exchange man, and exhibitor alike experience daily the effects of this precision in Bell & Howell Standard Cameras, Printers, Perforators, and Splicers. Perfect photography, perfect projection . . . thete is nothiog to answer for when Bell & Howell cinemachinery is used.

In the Bell & Howell Engineering Development lahoratories there are two major laws—accuracy and practicability. Every new design, every new ptinciple is devised with a view to the future as well as the ptesent exigencies of the industry. And in the execution of these designs and principles, thete must be ahsolute precision.

It is in this way that Bell & Howell has served the moving picture industry. It is in this way that it continues to serve. Your prohlem will find willing minds and willing hands in these lahoratories. Consultation on any phase of sound installations is particularly invited.

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Conrad Wells

DEATH LAST MONTH claimed another beloved member of the American Society of Cinematographers when Conrad Wells fell to his death in the tragic airplane accident that snuffed out the lives of eight motion picture workers and two pilots during the filming of a scene for a motion picture which Kenneth Hawks was directing for Fox

No one will ever know just what happened far up in the air over the waters of the broad Pacific which were sparkling beneath a brilliant sun Two planes containing the picture men were up there Suddenly they came together A burst of flame Then death

Conrad Wells departure from the Society leaves a gap that is hard to fill Quiet retiring shy he said little but his excellent work as a Cinematographer spoke more eloquently than words He was not a specialist in air photography, but when the call came for him to take to the air he stepped into the plane the same as he would walk onto a set No thought of danger could interfere with his love of his art And for his art he died—in line of duty

What more can a man give for his art than his life? And that is what Conrad Wells gave In his passing the Society loses a loyal member and the world loses an artist and a gentleman

Recent Releases of A. S. C. Members

No No Nanette —1st National	Sol Polito
"Glorifying The American Girl —Paramount	Geo Folsey
Marriage Playground —Paramount	Victor Milner
'The White Sheik"—UFA	Rene Guissart
'The Mysterious Island —M-G-M	Percy Hilburn
The Girl from Woolworth s —1st Nat	Jackson Rose
The Kibitzer '—Paramount	Al Gilks

New Color Process

KARL FREUND who photographed "Variety" Metropolis and The Last Laugh is perfecting a new color system using the Paramount Long Island studio for his experimental work The process is known as the Keller-Dorian color system and is said to be the first to use the primary colors Freund intends to make a color film entitled "New York"

Goss With Academy

FOSTER GOSS, well known writer and publicity man of Hollywood, has been added to the staff of the Academy of Motion picture Arts and Sciences in connection with the continuation of the Academy's school in sound recording

Bell & Howell Camera On Prince of Wales Hunting Trip

THE BIG GAME expedition of the Prince of Wales in East Africa has as part of the equipment a Bell & Howell standard motion picture camera with ultra speed attachment and two Eyemo turret head cameras Also His Royal Highness will undoubtedly carry his own personal Filmo camera which he has used so satisfactorily for some time

The cameras together with necessary lenses and accessories were purchased direct from the Bell & Howell offices in Chicago Negotiations were conducted by cable and were completed in three days after an initial inquiry was received from Commander Glen Kidston of the British Navy sent from Chalet Valerette-Chesieres, Switzerland where the Commander was evidently enjoying the winter sports In view of the fact that the Bell & Howell Company has had a wide experience in outfitting tropical and other expeditions, including that of the well-known explorer Martin Johnson Commander Kidston left the selection of the camera equipment to its technical service department

Mechanism to Project Films Without Intermittent Shutter

FROM London comes word that a non-intermittent projector which incorporates in its design a number of features which if successful, might have a revolutionary effect on present methods has been demonstrated at the workshop of W E John in Kingston-on-Thames, near London The inventors are John and Messrs Roberts and Campbell Sir Abe Bailey, South African capitalist, backed the experimental work and it is announced that Bailey Southwell has been named chairman of a company, Photo-Vision Ltd , formed to market the device

The basic feature of the new type of mechanism through which the film runs continuously is a set of lenses arranged in a circuit shape like the letter D The film moves in front of the flat side each frame moving upward evenly with a lens which meets it at the lowest point of the flat side of the circuit As another frame rises to this point another lens coming down the curved side of the circuit meets it and travels upward evenly with it Light is admitted through only one of the frames at a time, though the gate could be enlarged it is said to accommodate more frames

The light shining through the frame is received by a front lens which is the one that refracts the light onto the screen

It is pointed out that this method could be capable of eliminating any flicker which may result from the intermittent process It is also said that sound could be recorded directly opposite its corresponding frame Another feature claimed is that wider frames could be used on 35-mm stock by laying the frames along the film instead of transversely and running the film through the mechanism horizontally Simplification of the three-color process in colored cinematography is also declared to be possible with this mechanism

New Lubricant for Processing

WAX IS ENTIRELY eliminated in film processing by Stewart Process Co., New York which has developed a system which uses an invisible lubricant entirely covering the film This is said to make the film immune from chemical action of moisture water and oil and the affection of heat

Stewart's new process it is said toughens film to the extent that instead of leaving particles on the aperture gate it polishes and allows unrestricted passage through the projector The treatment is by a chemical dry process which is claimed to season the new green emulsion on film, allowing an extension of life and reduction of the liability of scratching on sound prints the latter factor eliminating cloud and rain effects

Van Trees on "Viennese Nights"

JAMES VAN TREES, A S C will be director of photography on Warner Bros big all sound all color musical picture, "Viennese Nights" Some unusually striking color effects are expected and Van Trees has been working on tests for some time Alan Crosland will direct

Tunis—Because of the language problem and small theaters sound pictures have not as yet made their appearance here Consul Leland L Smith declares

Watch for The Cinematographic Annual

Scene from the 'Vagabond King,' a Paramount-Famous-Lasky Production

even balance

LIGHT struck from National Photographic Carbons permits an even balance of light *and shade;* between actors and the rest of the set. Light from these arcs has penetrating power unequaled by any other form of studio lighting.

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National Photographic Carbons (White Flame or Panchromatic) are interchangeable and come in sizes to fit any studio arc lamp. Tests prove that they are the most economical form of studio lighting, as these carbons give more light per watt of electrical energy.

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White Flame and Panchromatic

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[illegible] Trader Horn ... Top shows DAnna and Director Van Duke [illegible]

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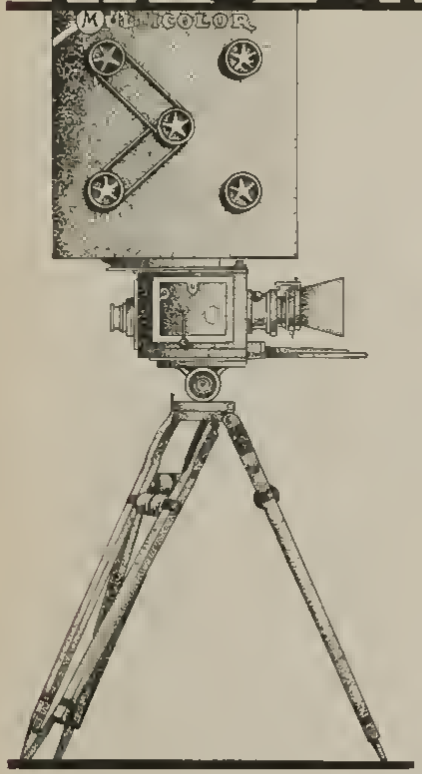

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Principles and Processes of Photography in Natural Colors

(Continued from Page 12)

between 1908 and 1925 In this latter year rights were purchased by the Kodak Company for development particularly as an amateur process of color cinematography

Kodacolor is a three-color additive process which realizes the principles of a line screen method without the added difficulty of ruling a screen on the film support The secret of the process is based on a means of impressing a series of microscopic cylindrical lenses into and across the support side of panchromatic film A banded three-color filter is fitted into a holder in front and projector with the filter attachment for each The film is threaded in the camera with the emulsion side away from the lens so that the light, before it reaches the sensitive emulsion must be transmitted by the tiny embossed lenses each one of which thus images the bands of the color filter on the film If the subject is white, all three color filters allow light to pass and three lines are exposed under each lens element If the subject is red, that is, it reflects red light, only the red parts of the filter transmit the light and the emulsion areas illuminated by this section of the filter will be exposed With colors made up of more than one primary color it follows that more than one part of the tri-color filter will transmit the light

Perhaps this may be made a little clearer if only one lens element and one color of light, say blue is considered as shown in Fig 15. Here it is seen that the blue light exposes an area about one-third that under the lens element (No 1) On development this area becomes opaque (No 2) The film is then bleached and the remaining silver salts are given a controlled exposure (No 3) and developed up Now the area affected by the blue light becomes clear and transparent while the areas corresponding with the red and green filter segments are opaque (No 4). When white light is directed on this single lens section, it passes through the area where the blue light exposed the film, and since the optical system is reversible, it follows that the light will strike the blue segment of the filter and form a blue spot on the screen since no light reaches either the green or red filter segments

In other words, all the tiny line areas transmit all, part, or no light, according as the subject reflects all, or part or none of the corresponding colored light The various colors are recombined on the screen to reproduce the natural colors of the subject photographed

Examination of an actual picture will make this principle clearer Fig 16 shows, on the left, a picture on Kodacolor film (actual size) of a child wearing a red hat The child's head stands out in silhouette against a blue sky In the enlargement on the right of one picture of the series, the characteristic line composition of a Kodacolor picture is readily discernible Note that the lines are alternately dark and light where the red hat is reproduced (shown by arrow A) thus allowing light to pass through the image so that it will be transmitted only by the red part of the color filter In the area representing the blue sky, the lines are dark and light, but they are displaced slightly from their position in the area of the red hat This is best seen in the parts of the sky next to the hat (shown by arrow B) The sky area reproduces as blue on the screen since only the blue part of the filter will receive and transmit the light passing through that part of the picture

Motion portraits made by the Kodacolor process using artificial light in a specially constructed studio were shown at Buffalo N Y, in May 1929

Another amateur color process known as Vitacolor also appeared recently which incorporates the old Kinemacolor principle (see below) except that a multicolor sector wheel is rotated in front of the camera and projector lenses instead of a shutter with only three primary colors Alternate frames are exposed through this color sector at 26-28 pictures per second

(b) Two Color Additive Processes Difficulties attending three-color processes prompted W Friese Greene and others to try to devise satisfactory two-color additive processes One of these known as "Kinemacolor" enjoyed some commercial success Like Friese-Green's first method it used a rotating disk or shutter of color filters before the lens The pictures were taken alternately through red and green filters at twice the normal speed and projected at the same speed Considerable trouble from color fringing was found with these methods About 1925 C Friese-Greene the son of the other inventor, produced a process called "Spectrum Films" which employs a special color shutter in the taking camera that is claimed to reduce some of the trouble from these optical errors

Another method of securing two color additive effects consisted in dyeing up the alternate frames of a Kinemacolor or allied positive red and green respectively and projecting the film at twice the normal speed This gave an effect similar to that of using a rotating color sector wheel before the projector lens

2 Subtractive Motion Picture Color Processes

(a) Three-color Methods Three-color subtractive processes present very great difficulties as it would be necessary by dyed bichromate or dye mordanting methods to apply three successive color layers and recoat with gelatin after each application Most of the commercially workable processes are two-color sub*tractive* methods

(b) Two color Methods In these color may be incorporated in one emulsion layer on opposite sides of the film or in two layers on one side of the film Several methods have been worked out, some use a dye mordant treatment and some an imbibition process and others chemical toning methods Three methods of taking pictures have been adopted Simple alternate exposure through red and green filters the use of twin lenses corrected to the wave-lengths of the respective filters or the use of optical systems of semi-transparent mirrors which split the beam of light and exposes the two images simultaneously The last method overcomes all parallax and fringing errors

P. D Brewster adapted the bi-pack scheme to cinematography He used a double coated negative film containing a transparent emulsion sensitive to the blue-green on the side of the film toward the lens and on the other side either a panchromatic emulsion or one sensitive to the red orange and yellow After processing the film in the usual way, the images were bleached and dyed with basic dyes of the same color as used for the filters The color negative obtained was used to make prints on double coated positive film A prism beam-splitter was used in the printer and the two images printed through the respective filters onto opposite sides of the film The final silver images were bleached and dyed in the same colors as the printing filters The color positive could be projected in the usual way on a standard projector

Several methods of producing two images on single coated

(Continued on Page 44)

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The Animated Dolls "Go Talkie"

LADISLAS STAREVITCH, the patient director of numerous films of which the actors are—dolls is making a sound film inspired by the epic poem of the twelfth century, *The Tale of Renard* (*Le Roman de Renard*)

This will not exactly be his first sound film for *The Little Parade*, a silent film taken from Andersen's fairy-tale *The Brave Little Lead Soldier* has been synchronized

"How do you conceive the sound part of your films?" we asked Starevitch

The words and very often the music will be conventionalized Let me explain When at the beginning of *The Tale of Renard*, we see the frogs manifesting their joy at being present at the renewal of nature we will hear the words 'Lovely Spring' 'Lovely Spring' spoken by a voice that somewhat resembles the croak of these animals

'It will be the same for the musical accompaniment When we see a dog which seems to growl the spectator will hear a sort of roll of drums imitating the noise, the braying of Master Aliboron will be rendered by the notes of a cello', the surprise of Renard, by a saxophone, and so on

Aside from this, the musical part of my films will allow the use of regular pieces specially composed for them- Moreover for *The Tale of Renard*, parts of Saint -Saens' *Carnival of the Animals* will undoubtedly be introduced in the score The recording of the noises the words and the musical score which one will hear in my productions will be not on film, but on discs

Are you pleased to be making sound films?'

Not entirely I am obliged to abandon certain visual effects which I liked to secure others less agreeable to the eye than the former but which permit the use of certain noises which are really striking The sound thus sometimes has priority over the picture

I insist likewise that one must not compare *The Little Parade*, my first sound film with the second *The Tale of Renard* The scenario of the latter has been made with the intention of making a sound and talking film while *The Little Parade* is a silent picture for which we have lately provided a sound synchronization in no way intended at the time of its making

Besides *The Tale of Renard* is a feature film of six reels whereas *The Little Parade* is a short subject

'Up to now, the dolls by which I have been served in all my preceding films have been quite small-sized That isn't so now - - - -'

And Starevitch showed us the future interpreters of *The Tale of Renard*, the largest of them the Lion measured nearly a yard

'The heads of these dolls being fairly large,' continued Starevitch 'I shall be able to show them in close-ups These actors will have facial expressions by which to convey to the spectators what they think Also *The Tale of Renard* will not use any subtitles

Utilizing now actors of a very much larger size than those of my other films, I must also shoot in a fairly large studio and with settings and furniture of sizes vastly larger than before"

A man might almost seat himself in the throne of King Lion which Starevitch showed me

'*The Tale of Renard* will include several scenes made with living actors They will represent men as the animals see them It goes without saying that the peasants appeared like demons to the Wolf to Renard and the others' The work of the actors is thus automatically simplified

Where will you photograph the really human scenes?'

"At the Billancourt Studios and in Brittany'

'How long will it take to complete *The Tale of Renard*?'

'Eight months. But the preparation and execution of the film will all told demand fourteen months'

Louis Saurel in Cinemonde Paris

Denmark

A new Company Nordisk Tone Film has been founded in Copenhagen with a capital of 2,000 000 crowns It possesses a modern apparatus factory and a studio in Valby, which has been reconstructed and adapted for sound film production The Company further owns a technical factory for which American film printing machinrs have recently been acquired

Watch for The Cinematographic Annual

At Last It Is Possible!

For many years Directors and Camera Men have desired special effects in their films after the sets have been shot and dismantled, or it is too late or too expensive to make a retake. Such effects as making a long shot into a close-up, putting in lap dissolves and fades, making a miniature of a scene and double exposing it over another scene, and other special effects.

To meet this situation, the Burton Holmes Laboratory has installed one of the new DEPUE 35 mm. Optical Printers which will do all of the above stunts and many more.

Keeping abreast or ahead of the times has always been the policy of this organization.

Burton Holmes Laboratory

7510 N. Ashland Ave. CHICAGO, ILLINOIS

Motion Picture Sound Recording

(Continued from Page 11)

to contamination of the developer as well as possible variations in the film stock itself With careful processing and care in protection of the negative exposure the film's contribution to the ground noise can be kept below the other sources of undesired noise namely, system and set noises

The film technician is called on to provide suitable negative exposure and positive timing and appropriate development of the negative and the positive so that the negative exposure as it varies from moment to moment shall appear as a positive transmission similarly varying In other words the contrasts of negative exposure must be faithfully reproduced as contrasts of positive transmission To accomplish this we go back to the work of Hurter and Driffield who forty years ago established the requirements

Hurter and Driffield showed that every photographic emulsion may be described by a characteristic curve, known since their work as the H and D curve It is convenient to plot the data in logarithmic terms to show the relation between the exposure and the resulting photographic effect We choose the logarithm of the exposure, measured in meter-candle seconds or in any other convenient units of light energy, and plot the logarithms of successive exposures against the resulting densities Photographic density is defined as the logarithm of the opacity Opacity itself is the reciprocal of the transmission which is the ratio of the amount of light transmitted by a piece of developed exposure to that which falls upon it We shall for the present avoid the troublesome technicalities of specular and diffuse densities, and consider that satisfactory measurements have been made of the exposure and of the density resulting

If a series of graded exposures are made on a series of areas of a photographic film and a curve plotted between the logarithms of exposures as abscissas and the developed densities as ordinates, we find the underexposure region represented by a portion of the curve concave upward followed by a straight portion corresponding to the region of correct exposure, and finally the overexposure which appears as a curve concave downward The slope of the straight line portion is determined, for any particular type of emulsion, by the development—this slope is called gamma and defines contrast

Curves of this kind are obtained for the emulsions for the negative sound record and for the positive prints, for various developments It is thus possible to determine what development to give for any desired contrast

Hurter and Driffield showed that perfect reproduction in the positive of the contrasts of the negative exposure can be had only if we arrange to confine the exposures on both the negative and print to the straight line portion and furthermore arrange the development of both films so that the contrasts are reciprocal It can be demonstrated that if the exposures are restricted to the correct exposure regions and if the gammas of development are made to have reciprocal values the variations in the negative exposure are properly reproduced as variations of positive transmission

It is to be emphasized that the photographic problem of sound differs from that of the picture The sound record requires exact contrast reproduction whereas the picture may call for an enhancement of the brightness values of the scene photographed For this reason it is an advantage to make sound and picture negatives on separate films The picture negative can then be developed as desired and the sound negative can be given the treatment which insures a negative gamma the reciprocal of that of the release print development

Then it must be pointed out that the ordinary methods of sensitometry which are used to determine the contrast factors (gammas) of development require some correction to take into account the difference between exposures in the sound recording machine which exposes an element of the film for a very short time to a very bright light, and those usually made in sensitometry further account must be taken of the conditions of reproduction, involving the manner in which the reproducing light is focussed on the film and the electrical circuit connecting the photocell to its amplifier

The lamp current to be used in the recording machine must be determined by test in order to produce in the film an exposure for the undisturbed light valve such that doubling this exposure when the valve is open to double width (full modulation) shall be just clear of overexposure for the emulsion used and for the development it is decided to give the negative sound record Unmodulated tracks should be made with various lamp currents developed all to the chosen contrast and that current determined which results in the density corresponding to the ideal negative exposure

From investigations made for the purpose it is possible to tabulate appropriate pairs of values of positive and negative gammas and appropriate densities for the unmodulated tracks The H and D curves are to be obtained from sensitometer strips prepared in the usual way, and these densities are to be measured diffusely For example if the practice of the release print development involves a positive gamma of 1 75 the proper negative gamma for the sound record is 0 6 and the proper density of the unmodulated negative track is 0 6 referred to the fog density A density of 0 5 is satisfactory for the unmodulated positive track These values are accurate for Eastman positive film and are substantially so for the other positive stocks which might be used in recording and in printing

The limits of permissible modulation of negative exposure when using the light valve can be determined from observation of the valve's own behavior and from a study of the H and D curve Mechanically the valve moves in exact proportion to the speech currents up to 90% modulation Photographically, with the lamp current adjusted to give the proper density of the unmodulated track, 90% modulation can be used without driving the negative exposure into the under exposure regions This modulation is only 1 db below full modulation, and for the occasional peaks which reach full modulation for a few thousandths of a second the distortion is not detectible

Let us assume that we have so regulated the recording that only for occasional peaks is 100% modulation reached, and we have so controlled developments that the product of the positive and negative gammas is correct It must be recognized that no amount of care in control of development will insure exact and unchanging value of gammas, either for negative record or for release prints Some tolerances must be determined, fixing extremes of variation in development within which the sound quality is not noticeably affected

(Continued on Page 41)

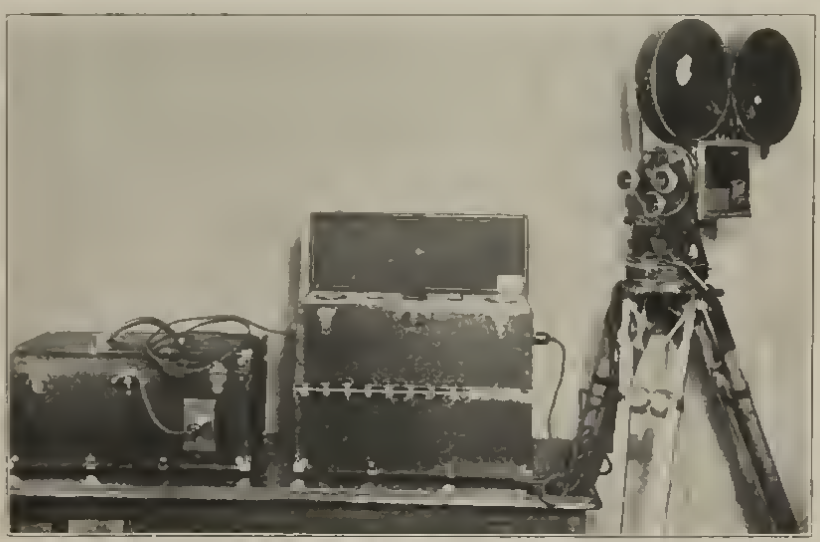
NEW PORTABLE RECORDER

Hollywood Firm Now Producing Recording Apparatus That Should be Boon to News Reel and Commercial Cinematographers

SINCE the advent of sound Commercial and Industrial picture organizations scattered throughout the world have been hard put to solve their individual sound problems This has been due largely to the fact that what they have needed has been a portable recording device that is both practical and within the reach of the individual industrial or free lance news reel man's pocketbook

Now a concern located in Hollywood comes forward with a portable recording device which its makers claim will solve the problems of those in the field This company is the Reeltone Corporation

The entire recording equipment of the Reeltone device is carried in two cases easily carried anywhere the cameraman desires The entire weight of the two cases and the equipment is seventy pounds One man can carry the complete equipment handily



Simplicity efficiency and quality have been aimed at by the Reeltone company In working out the equipment they not only utilized engineering brains but had a practical cameraman who has traveled all over the world getting newsreel pictures contribute his ideas This cameraman is Len Roos, A S C. whose own light — The Tanar Light — is used in the equipment

"We had to plan a piece of equipment that would not require the daily presence and attention of a sound engineer" said Walter de Courcy general manager as a newsreel man miles from civilization cannot stop for the arrival of sound experts So you do not have to be a sound engineer to operate our equipment The control panel is extremely simple to operate and you do not have to be an experienced mixer to get first class results

It is only necessary to plug in three cables connecting the microphone power supply camera motor and recording light Then you are ready to operate Approximately three minutes is all the time required to set up the sound equipment

Another outstanding feature we believe is the fact that the amplifier has sufficient gain to handle difficult jobs where it is impossible to move the microphone in close And this is accomplished without distortion Due to the rugged construction of the Tanar recording light that we use exposure of the sound track can be varied

We have stressed ruggedness and every piece of apparatus used in the construction of the recorder is the highest quality the market affords Our engineers test every piece of equipment as carefully as it is humanly and mechanically possible so that when a cameraman takes his equipment far into the wilds as is often the case there will be absolutely no danger of the recording equipment going wrong

"We feel that we have the solution to the sound problems of newsreel and commercial men and invite inspection"

This portable recorder in my opinion says Mr Roos will be a marvelous device for the men who have to rush about all over the world to record the news events for the news screen We have tried to make it as handy for transportation as possible, and I believe we have produced a device that will prove a real boon to all newsreel and industrial men"

Fixing Baths

(Continued from Page 18)

by the film oxidizes and stains the bath, but if revived with acid at intervals the bath does not stain up to the point when the time of fixation becomes excessive

(d) The fixing bath is usually discarded at the point when the time of fixation (twice the clearing time) is excessive The limiting time of fixation which can be tolerated depends upon circumstances, but average maximum fixing times (twice the time to clear) for negative and positive motion picture film are 20 and 6 minutes respectively, when it is usually more economical to discard the bath

In the case of the F-2 bath containing 25% of hypo and without agitation of the film, the clearing time exceeds 10 minutes after fixing 200 feet of negative motion picture film per gallon With positive film the clearing time exceeds 3 minutes after fixing 600 feet of film per gallon With a degree of agitation corresponding to that existing with machine development at a moderate speed, with negative film the time to clear exceeds 10 minutes after fixing 300 feet per gallon while with positive film the time to clear is less than 2 minutes after fixing 700 feet per gallon If the bath is revived by the addition of hypo at intervals the above footage figures will be increased accordingly

7. Importance of Rinse or Stop Bath—Rinsing in water previous to fixing prevents the carrying over of developer into the fixing bath and this retards the formation of a sludge of aluminium sulfite in the absence of revival with acid An excess of developer also lowers the hardening properties and renders the bath alkaline and liable to stain Rinsing therefore, prolongs the life of the fixing bath and insures that its various properties remain more nearly uniform throughout its life

In the case of some processing machines when the film would be otherwise exposed to the air for several seconds after leaving the developer tanks and before entering the fixing bath, it is desirable to arrest development by the use of an acid stop bath consisting of a 2 5% solution of sodium bisulfite or a 0 75% solution of acetic acid For hot weather processing a 2 0% solution of chrome alum is desirable [14] Such stop baths must be kept acid at all times Fixing baths to be used in conjunction with such acid stop baths should obviously contain a minimum of acid in the first place

8. Use of Two Fixing Baths The practice of using two fixing baths in succession is to be recommended When the first bath is exhausted it is replaced by a comparatively fresh second bath which in turn is replaced by a new one This scheme insures more rapid fixation than the use of only a single bath. For example, if the film just clears in X minutes in the first bath when practically exhausted and is allowed to remain for X ÷ 2 in the second bath it will be likely to be fixed more thoroughly than if it remained for 2X minutes in the first bath Also, if the hardening properties of the first bath are impaired because of exhaustion adequate hardening is produced in the second fresh bath However any stains or dichroic fog produced in the first bath are not removed in the second so that it is important to maintain the first one acid and agitate the film sufficiently on first immersion

9 Fixing Bath Troubles—A Sludging of the Fixing Bath A fixing bath may turn milky immediately on adding the hardener or after being in use for some time The milkiness may be of two kinds,

1. If the precipitation is pale yellow and settles very slowly on standing, it consists of sulfur and may be caused by,

(a) Too much acid in the hardener

(b) Too little sulfite or the use of impure sulfite, in which case there is not sufficient present to protect the hypo from the acid Loss of sulfite also occurs through oxidation if the hardener is stored in an open crock The surface of the liquid should be protected from the air by a floating cover of Kodaloid or preferably the hardener should be stored in an air-tight vessel

(c) High temperature The hardener should only be added to the hypo solution when at room temperature If the temperature of the acid fixing bath is over 85°F it will not remain clear longer than a few days even when mixed correctly The only remedy is to throw the sulfurized bath away and mix fresh solution as required.

If a sulfurized bath is used the sulfur is apt to be precipitated in the gelatin and later may cause fading of the image [2]

2 If the precipitate is white and disappears on standing for a few hours and a gelatinous sludge of aluminium sulfite settles out it may be caused by

(a) Too little acid in the hardener For example supposing a formula calls for pure glacial acetic acid and 28% acid is used by mistake, then less than one-third the required amount has been added

(b) To little hardener in the fixing bath Also, a fixing bath with the correct proportion of hardener when exhausted, still contains alum and sulfite but no acid and these combine to form a sludge of aluminium sulfite

It is extremely important therefore to use only the acid specified and to know its strength because trouble is caused if either more or less acid is used than is called for in the formula

Other acids than acetic are not generally to be recommended Mineral acids such as sulfuric are too strong while other organic acids such as citric, tartaric, etc can be used only under certain very limited conditions, since they interfere with hardening.

B The Bath Does Not Harden Satisfactorily Insufficient hardening may be a result of (1) the use of inferior alum which does not contain the correct proportion of aluminium sulfate (2) The presence of too much acid or sulfite, or an insufficient quantity of alum On varying the proportions of acid, alum, and sulfite in a fixing bath it has been found that the hardening increases as the quantity of alum increases With increasing quantities of acetic acid with a given quantity of alum, the hardening increases to a maximum beyond which the hardening decreases A certain minimum quantity of acetic acid, however, is necessary to give the fixing bath a fairly long useful life before aluminium sulfite precipitates but this quantity is usually greater than the quantity which produces maximum hardening With use, therefore the hardening ability of correctly compounded fixing baths at first increases with the addition of developer to a maximum beyond which the hardening falls off rapidly,

C Blisters When the sodium carbonate of the developer is neutralized by the acid in the fixing bath carbon dioxide gas is evolved which produces blisters if the gelatin is too soft to withstand the disruptive action of the gas If the fixing bath contains an excess of acid and the films are not rinsed sufficiently, or if a strongly acid rinse is used blisters are apt to be formed On dry film blisters appear as tiny crater-like depressions when examined by reflected light This trouble is more likely to occur in hot weather, and especially when the bath is not hardening sufficiently

D Dichroic Fog If the fixing bath does not contain acid or if it is old and exhausted and contains an excess of dissolved silver salts a stain called dichroic fog is sometimes produced on the film In reflected light, film stained in this way looks yellowish-pink Dichroic fog never occurs in a fresh acid fixing bath or if the film is rinsed before fixing and the temperature of the bath is kept at 65° to 70°F

E Scum on Fixing Baths. When a partially exhausted fixing bath is allowed to stand several days without use, the hydrogen sulfide gas usually present in the air reacts with the silver thiosulfate in the bath and forms a metallic-appearing scum on the surface of the solution This scum consists of silver sulfide and should be removed by drawing the edge of a sheet of blotting paper across the surface of the bath, or by using a skimmer made of several strips of cheese cloth stretched over a wire frame

F Stains Several different types of stains such as white aluminium sulfite stains, sulfur stains and yellow silver stains are occasionally produced For a complete discussion of fixing bath stains, reference should be made to an article on this subject [3]

15 Chimica Fotografia by R Namias (1912) p 431 Il progresso fotografico Milan

16 The Behavior of Gelatin in the Processing of Motion Picture Film by S E Sheppard *Trans Soc Mot Pict Eng XI* No 32 707 (1927)

17 Handling and Mixing Photographic Chemicals and Solutions by J I Crabtree and G E Matthews *Photo-Miniature Nos* 200-201, Tennant and Ward N Y (1927)

18 Graininess of Motion Picture Film by J I Crabtree *Trans Soc Mot Pict Eng XI* No 29 77 (1927)

19 The Handling of Motion Picture Film at High Temperatures by J I Crabtree *Trans Soc Mot Pict Eng* 19 39 (1924)

W. E. In 44 Countries

WORLD WIDE installations of Western Electric Sound Systems total 4466 Of this number 3322 are in the United States and 1144 in the foreign field Forty four foreign countries are represented in the list of foreign installations

A large studio is to be constructed in England at East Molesey Surrey by Col W W Power The project will involve more than $1,750,000 construction work

Russia

Estimates of film production during the 1929-1930 release season (from Sept 15th to May 1st), are being published in Russian trade papers It is scheduled to release 130 long feature films, 100 of which will be of domestic production

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A LIMITED number of copies of the ACADEMY TECHNICAL DIGEST on Fundamentals of Sound Recording and Reproduction for Motion Pictures will be available after February 10, 1930.

THE Digest includes papers by leading Sound Engineers of the Motion Picture Industry based upon their lectures in the school attended by 500 Hollywood Studio employees under the official sponsorship of the Academy of Motion Picture Arts and Sciences.

THE TECHNICAL DIGEST will be of interest to production studio technicians, to those in related industries, and to projectionists who have a general idea of processes for talking pictures but wish more specific information on equipment, practices and the basic principles of sound.

THE papers are written in as simple language as in consistent with accuracy. They are carefully illustrated by photographs schematic diagrams and graphs

MOVIOLAS NOW AVAILABLE FOR EDITING SOUND PICTURES

FOR YEARS one of the most useful aids in the cutting of pictures has been the familiar Moviola Film Viewing Machine which enables the cutter to view the scene or scenes upon which he is working as often as he may need to without leaving his cutting-room. Furthermore the Moviola can be operated either forward or backward and at any speed—even a single frame at a time—enabling the user to select the exact spot for cutting or inserting scenes. The value of these features can hardly be overrated as the universal use of the device bears witness.

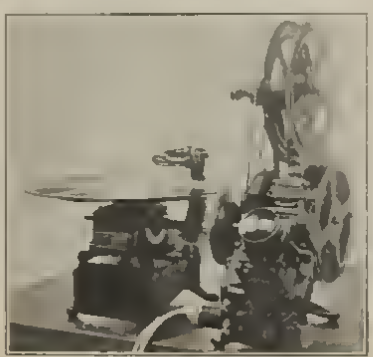
Now that sound as well as sight must be served in editing it is obvious that Moviolas for sound are vitally necessary. To meet this need Mr. Iwan Serrurier who created the silent Moviolas has developed three designs which perfectly meet the needs of the various sound systems.

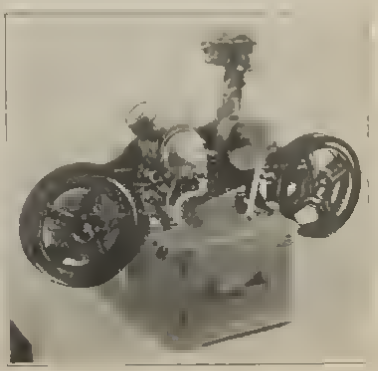
The first of these is for use with disc synchronized systems. It consists of a standard Model D Moviola which is capable of taking either a complete 1000-ft. reel of film or shorter lengths without the use of reels. To this is fitted a standard 331/3 R.P.M. turntable for the usual 16 inch discs playing through an acoustical or sound-box type of reproducer. The turntable is driven through a short flexible shaft attached to the Moviola's flywheel and may be quickly detached if it is desired to use the machine for silent work without the reproducer.

The second of the new units is for use with the sound on film processes where as is the general practice the picture and sound are on separate films. This unit is mounted on a sizeable cabinet which houses the amplifiers. To the right is a standard Model C Moviola (the model which is fitted only for running shorter lengths of film). Connected to it by a flexible shaft is the sound head which is equipped with RCA-Photophone equipment. The film passes through this sound head exactly as it does through the Moviola beside it save that its motion is continuous instead of intermittent. Above the film track and in relatively the same position is the viewing lens on the companion machine is the exciting lamp. The beam from this is focused on the sound-track by the usual Photophone optical system and the sound is picked up by an RCA Potassium photo-cell mounted inside the machine in about the same position as the illuminant on the picture viewer. The sound current then goes though the necessary amplification, and is reproduced through an RCA 100-A loudspeaker. Both the sound and picture heads are driven by the same motor which is belted to their common flexible driving shaft and equipped with the usual Moviola reversing switch and treadle speed-control. The unit operates on any ordinary 110 volt lighting current.

The latest unit to be announced is particularly for use in the later stages of editing after the sound-track and picture have been joined into a single film and for the editing of news films which are usually taken directly on a single film. Like the Model 'D', it is designed to use either standard 1000 ft. reels or shorter lengths fed by hand but here the resemblance ends for it is in entirely new design. Probably the most unusual of its features is the fact that the film movement throughout is continuous. The picture is regulated by a rotary shutter which passes completely around the inside of the cylindrical lamp housing, over which the film passes. This arrangement greatly reduces both the noise of operation and the strain on the film while giving a perfectly steady image. The motor-drive as in all other Moviolas is reversible and fitted with the usual treadle speed controller. The sound head which is in appearance very like the picture-head is also equipped with an RCA-Photophone pickup which of course will reproduce from the sound tracks made by any of the other sound-on-film systems. The amplifier is in this model placed in a compact metal cabinet about the size and appearance of the ordinary table radio set and upon which the Moviola proper is mounted. This also operates on any standard lighting circuit and plays through an RCA 100-A speaker.

These three new lines are becoming popular very rapidly and their widespread use is freely predicted.





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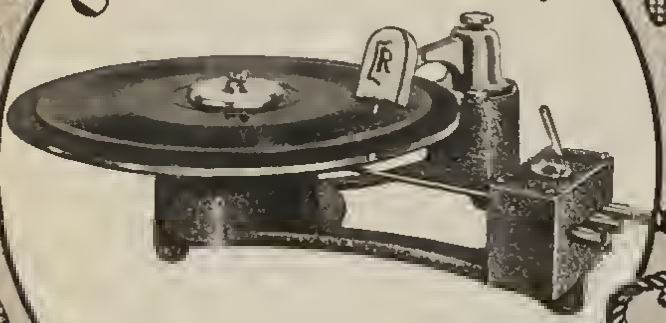

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By WILLIAM STULL, A. S. C.

ALL THIS generally unpleasant season while winter is merging into spring the proper editing and titling of home films is a pleasant and profitable task. Most of us are prone to let these details—especially titling—slip and exhibit our films with the titles verbally extemporized as we project. This is rarely popular even among our best friends and now that the elements have confined most of our cinematics to indoor work it is a good time to remedy it.

The principal reasons for using titles are:

1. To explain the theme and purpose of the picture.
2. To identify and characterize the actors, the setting and the time of the action.
3. To convey ideas which the pictorial action cannot or does not convey, for example spoken dialogue.
4. To cover lapses of time, changes of location or jumps in continuity.
5. To economize in the matter of footage and to save production costs, where substituting for scenes not shown.

In some of these cases titles can be dispensed with in others they cannot. It is obvious that pictured action is always more effective than the printed word. Therefore especially in making films which can be shot from some sort of premeditated scenario or outline never include a title in the script where some visual device can be used. Such pictorial devices are always more telling than even the best titles and give subtlety to a picture. The use of such things—unhappily now a declining art since the coming of sound—has been one of the most important artifices of the great directors of the Lubitsch-Chaplin school. In any event titles should always be used sparingly when in doubt about a title don't use it!

"Now This Overdone, or Come Tardy Off, Makes the Unskillful Laugh, and the Judicious Grieve."

But where titles are used be sure that they are perfect. One need only see a few of the early films to realize the tremendous harm badly-written titles are capable of. Even in the most gripping moments the exaggerated heroics the trashy sentiment and the pedantic explanations offered by these titular monstrosities are now mirth-provoking. A parallel might be mentioned in the vogue of *After Dark* and other antiquated melodramas on the stage today—as comedies. At any rate be careful that your titles are so worded as to be in perfect harmony with the mood of your picture and for heaven's sake don't over write. Make them clear and concise, brief but not telegraphic. Don't be afraid to re-write even the simplest caption a dozen times or more until you feel that it cannot be improved. Keep the wording clear, correct and understandable without any unnecessary slang or technical terminology. Likewise, be careful in your wise-cracking. Remember that humor is one of the fastest changing parts of modern life; nobody reads yesterday's jokes nor will you laugh at last years' smart cracking titles. Let the action carry the humor wherever possible (this is *not* an argument in favor of slapstick and custard-pies!) and when comic titles are needed remember that for every George Marion Jr. and Ralph Spence we have had to suffer the work of a dozen inexpert punsters. If your picture is flat badly written wise cracks on the title-cards won't help it.

"Came the Dawn."

A point to remember in connection with titles indicating a change in time or place is that the length of the title should be somewhat proportionate to the time or space gap they bridge. Action occurring say an hour or two later can be introduced by a title bearing just those words but if several years elapse a title bearing the bald statement of the fact is often too brief an interval to allow the audience to readjust itself. In such a case, in order to avoid becoming too wordy, it is a good plan to fade (or iris) out on the preceding scene and fade into the succeeding one; if the lapse is particularly long the title may even be faded in and out. It is by the way, always a good policy to fade in and out of scenes connected with such changes of time or place, except of course where direct cuts between separated locales are made to maintain parallel action.

Concerning the footage allowed for titles the practice generally followed by professionals is to allow one second per word for the first ten words, and thereafter one-half second per word. For 16 mm use the same standard may be employed but as professional titles are timed for the reading-speed of the *average* intelligence of the general public, while the home movie is usually presented before audiences of a much higher level of culture a standard of one-half second per word—with a minimum of three or four seconds—may safely be used figuring 2½ seconds to the foot of film.

What's in the Cards?

The titles themselves of course have to be in some way lettered upon cards which are subsequently photographed on motion picture film and inserted in the picture. Here there is room for almost limitless ingenuity.

The simplest sort of title is the plain printed card carrying the letters and no more. This card may be photographed so as to show up white with black letters or the customary black with white letters. The latter is generally the more advisable. For most purposes this is best done by using a normal white card with black-printed letters and photographing it with positive film. This positive is then joined in with the rest of the picture like an ordinary scene. Negative film could of course be used the same way, but the positive stock gives a better contrast between the blacks and whites and costs less. Reversal film of course would not do at all; if one wants to use it, or to have a negative of the title, the card itself must naturally be black with white letters.

For the more important titles and wherever quality is of greater importance than price hand-lettered titles should be used for the hand-work gives a distinctive quality that printing cannot achieve. This hand-work, of course may be done by the amateur himself if he feels competent to do it or by any of the many titling firms throughout the country. The title-cards used can be of small size but it is safer to use larger ones—say around 14"x20"—as not only are minor errors in execution less noticeable but the camera need not be brought so inconveniently close to photograph the card. In the actual photographing, the camera and card must be parallel in all planes and the optical axis of the lens perpendicular to the centre of the card. A handy arrangement to assure this is to point the camera downward above the card and drop a plumb-line from the centre of the lens to the centre of the card. Also the card must have absolutely even illumination. It does not require unusually powerful illumination as titles may be and usually are made with the single-picture movement of the camera but the illumination it does get must be absolutely even unless one side of the title is to be brighter than the other on the screen. Of course the more powerful the illumination the better for a smaller diaphragm opening may be used. The exposure may be determined by making and developing test steps if one does his own developing or by such an exposure meter as the reliable *Cinephot* if he is in the class of most of us.

Decoration

In case that something more than the mere wording is desired there are many days of decorating titles. One of them is the use of mottled or patterned backgrounds. The titles can be lettered on any material naturally and there is a vast selection available. Wall-paper is often convenient for this purpose but it must be remembered that the actinic value of the pattern may

be far different from the visual value; as a safeguard use your monotone glass to inspect it before you shoot!

Another very popular method is the use of a specialty printed still picture for a background This idea was introduced by our well-known contributor, Syril Dnsenbery, of San Francisco a number of years ago The picture may be almost any one suiting the theme of the film into which it is to be inserted If a special photograph is made, the negative is correctly exposed but somewhat underdeveloped while the print—usually an enlargement—is rather over-printed so as to give a good dark print, of good gradation but limited scale with no tones above a middle gray, so that the pure white letters stand out well A variation of this would be to letter on a sheet of clear celluloid —not too thick a one—and superimpose this on the photograph when photographing the title, thus preserving the background print for future use A further variation is to make a still enlargement of the first frame of the following scene using this as a background as before When the title is completed the cut from the title to action is almost imperceptible the title disappearing and the background coming to life simultaneously Still another variation is the use of the well-known Heinz titlehood in which the title is lettered on a transparent support and the title made by pointing the hood (with camera attached!) directly at the sky, and shooting The device can also be used to make animated title-backgrounds by using a tripod and first making a long-shot of the background desired and then shifting the focus to the 18" mark whereat the title-card is in focus, and then refocusing on the scene when the title has received footage enough

Personality Titles

Such art-titles should only be used at the beginning and end of a picture, and at points in the action where there are important changes in time place or dramatic mood For other titles simplicity should as a rule be the keynote A dignified border is sometimes desirable particularly one bearing the name or initials of the filmer, as was the style in professional films a few years ago D W Griffith's distinctive style is memorable as he always had either his signature or initials worked into the border of every title Such a border might be made up as a cut-out or on celluloid to be used for all the titles of a picture or series of pictures Another 'stock' title is of course *The End*, which is used in every picture It is not a bad idea to make upa hundred feet or so of this at a time using strips cut from the roll as they are needed It is even better to make a negative of this to save re-photographing the title card whenever a reprint is needed Similarly another stock title should be one identifying the picture as the product or property of the individual It may read, say, some such phrase as *A John Smith Production*, or *From the Library of A John Smith* Behind may be any sort of background or conventional design desired such as for instance, Marshall Neilan's famous *Swastika* trademark, Paramount's mountain-top or if the individual legitimately owns such a thing a coat of arms

Titular Trickery

There is such a vast range of possibilities in trick titles that even to suggest a few would crowd all the other articles out of this magazine For instance there is the whole vast field of animation open to the experimenter Animated titles may range from the simplest form—cut out letters dancing into the picture and forming themselves into words—up through the more complicated effects of whirling and exploding circles stars and geometrical figures to the final intricate effects of animated miniatures These last, such as clouds, dust or snow blowing into the form of the letters wanted can most easily be done in reverse action first photographing the completed title, and then proceeding to disitegrate it to the form desired for a beginning, photographing it of course with the camera running backward, or, in the case of the motor-driven cameras, inverted A still further development of the trick title leads into the fascinating realm of multiple exposure and multiple printing Aside from furnishing very spectacular effects these processes can be highly enjoyable to the experimentally inclined camerist Both are increasingly difficult of course and not to be undertaken by the novice but there are few thrills comparable to that felt as you see your first successful trick scene or title flashed upon the screen Particularly this is true in the matter of double exposure where the thrill of knowing that you've been able to match up your separate exposures so that they are in perfect harmony photographically and in perfect register is like nothing else in the world

"Suit the Word to the Action"

Once the titles are made, there is still a great deal left to be accomplished in fitting them into exactly the right spots in the picture A good title in the wrong place is worse than no title at all Therefore before ever you write your titles, be familiar with the picture from every angle—especially that of the audience which is *not* familiar with it Make sure of each spot for a title make yourself certain that there is a definite need for a title there and that a title will not be confusing in that particular position Then write your title After you've assembled your film and titles project it a few times for yourself checking each point carefully Are the titles worded properly? Are they optically satisfactory are the words spaced so as to be easily readable? Is the Decoration not intrusive? Is the photographic tone of the title satisfactorily matched to that of the scenes it is cut into? Then again assure yourself that the title is in its right spot! is it surely not intrusive? Is it wholly necessary? Is it, in spoken titles absolutely clear who is speaking? In this latter case always avoid cutting a spoken title into a long or medium shot, unless the title can be so worded as to make it absolutely unmistakeable who is speaking it It is always the best policy to flash a bit of a close-up before and after a spoken title and then return to the original longer shot But above all things don't let your titles spoken or otherwise interrupt the dramatic action A spoken title, no matter how good, cut into, say, the traditional fight between the hero and the heavy is ruinous to the tempo of the sequence Imagine giving *Sidney Carton* a title just as the guillotine is falling!

Try It On the Dog!

After all these things have been done and you feel sure that you've succeeded in all of them try your film out on an audience Not necessarily a large group but one which knows you well enough to be frank If your handiwork passes through this ordeal unscathed it can be accounted well done!

Of Interest To Amateurs

Screens Reduced

AMATEURS will be interested to learn that the prices of the home model deVry Beaded Screens have been reduced All of the Tripod models were reduced $5 making the prices range between $20 and $30 A new folding Table Model has been introduced at prices ranging from $13 to $15 No change has been made in the deVry Frame Screen

Pretentious Enlargement

WHAT is said to be one of the most pretentious enlargements ever made from a small photograph is a stage backing used by the Tiffany Studios in *Peacock Alley* Mae Murray's current production

The original made with a small Eastman Kodak is of a fashionable New York apartment building This original 5x7 photograph has been enlarged to make a 22x40 foot setting the work being done in a Hollywood Photographic studio

Research by de Vry

H. A de Vry Vice-Pres of the Q R S deVry Corp and famous-s the inventor of the first suit-case type of projector is now devoting all his time to research and experimental work on motion-picture apparatus

The company's manufacturing activities are being concentrated at the Q R S Chicago plant

Miniature Phonofilm for Narrow Film Developed

ACCORDING to announcement Dr Lee De Forest research engineer for General Talking Pictures has developed a miniature Phonofilm for reproducing sound on 16mm narrow width film The total weight of the sound reproducer and projector is less than 20 pounds it is claimed. Patent applications have been filed for the device and preparations are under way for the manufacture of the apparatus for use by amateurs and commercial photographers

Inflammable Screen

AFTER A LONG period of experiments and tests on many sound screens submitted Electrical Research Products has found a non-inflammable sound screen which satisfactorily meets all requirements This new screen is now available to all Western Electric wired theatres and for future installations In general appearance the new screen is similar to the one now in use

"MOTHER'S DAY"

A Scenario Designed for a Pleasing Mother Picture That Any Home Movie Maker Should be Able to Do.

By LORETTA K. DEAN

MOTHER'S DAY *will soon be with us and we will be buying her flowers (those of us who are fortunate enough to have a Mother) Why not make Her a picture? We will be pleased to hear from those who use this scenario—Editor's Note*

Scene 1 Close-up of a Big Ben alarm clock ringing vigorously as the hands point to six o'clock Run sufficient of this to establish shot and cut to—

Scene 2 A medium shot of twin beds Mother is in one Father is in the other We see Father slowly and carefully peep over towards Mother He has a look on his face that seems to say 'Why doesn't she get up and stop it' As the bedclothes on Mother's bed start to stir, Father very carefully slides down in the bed and covers his face with the sheet But Mother just as carefully slips out of bed and tiptoes quietly across the room and shuts off the alarm Stealthily she tiptoes over to Father's bed gazes down at him with a sweet smile and then donning dressing gown and slippers she tiptoes from the room And as she disappears through the door we see Father peeping slyly over the edge of the bedclothes and when he is sure she has gone he turns over with a big sigh and goes back to sleep as we cut to

Title Mother is happy today—for it is an 'easy' day for her—

Scene 3 We discover Mother in the kitchen She has donned her house dress and is busily engaged in the task of setting a table in a little breakfast nook mixing dough for biscuits stirring the oatmeal and letting in the family dog and cat But she is apparently happy for there is a look of contentment on her face Suddenly she looks up and listens as though she hears a sound from another room And we cut to—

Scene 4 A bedroom Two husky boys are having a pillow fight The fight is at its height when one of the pillows goes wild and crashes into a vase of flowers on a table As flowers and vase hit the floor the two boys suddenly stop their battle One jumps out of bed and hurriedly retrieves the pillow and hops back into bed Both boys feign peaceful slumber as they hear the footsteps of Mother approaching and we cut to—

Scene 5 Mother is rushing through a hall and heading for the bedroom

Scene 6 We see in a medium shot Mother entering the room Cut to

Scene 7 Close up of the bed The two boys are sleeping apparently soundly One is even snoring through open mouth Cut to

Scene 8 Close-up of Mother She at first looks angry and then a smile plays slowly across her face as she watches the youngsters in the bed As she watches them the smile grows broader A few feet of this and cut to

Scene 9 Close up of the boys One is slowly opening his right eye to see what Mother's reaction is Then he opens both and we cut to—

Scene 9 Medium shot taking in Mother and the boys Mother starts to laugh and rushing to the bed starts a little pillow fight of her own The boys join in the fun and for a brief time excitement and laughter reign in the little bedroom Cut to—

Scene 10 Father is discovered in a disturbed state of mind he is more than disturbed He is wrathy for the noise has awakened him from his beauty nap He covers his head with the bedclothes but it is no use He sits up in bed and shouts—

Spoken Title Can't you be quiet—Don't you realize I need my rest—'

Scene 11 But in the bedroom they do not hear and continue the rough-house until Mother finally gets the two boys out of bed The scuffle ends suddenly as the two boys throw their arms around Mother and start to kiss her But Mother suddenly looks horrified and starts to sniff as though she detects an odor of smoke as we cut to—

Scene 12 It is a medium shot of the kitchen Smoke is pouring from the oven in great clouds A short shot of this and cut to—

Scene 13 Mother is hurrying from the bedroom as we cut back to—

Scene 14 Mother is rushing into the kitchen She opens the oven and pulls a pan of biscuits from the oven They are a charred mass Mother dashes to the sink turns the water on them opens the windows and sitting down on a chair she begins to weep As she does one of the boys steals quietly into the kitchen and putting his arms around her kisses her and says—

Spoken Title 'Never mind the old biscuits, Mother—You can bake some more— And as he finishes his speech Mother lifts him onto her lap and kisses him As she sits there holding the boy, Father suddenly bursts hurriedly and excitedly into the kitchen He is struggling with his coat, has one arm in one sleeve, but can't find the other The youngster rushes over and straightens out the coat and as Father gets into it he dashes to the table and finding it empty, turns to Mother and says - - - -

Spoken Title Can't we ever have breakfast on time here - - - - -"

As he finishes he pulls out his watch and starts to get up But Mother is pouring him a cup of coffee and says - -

Spoken Title 'Now, Robert You'll die of heart attack some day if - - -"

But she never finishes her sentence for Father has attempted to gulp down the hot coffee and as it burns his mouth he drops the cup and jumping from the table rushes to the sink and filling a glass with water drinks it hurriedly Mother attempts to soothe him but he pulls out his watch again and shouts

Spoken Title Some day I might get breakfast in this house - - -"

Finishing his sentence he dashes through the door and as he does mother goes to the door and watches him rather sadly and here we fade out

Note You can fade out very well at this point with a chemical fade which the laboratory will do for you when developing your film

With another chemical fade we fade in on - -

Title The children to school the dishes washed the house cleaned the front porch scrubbed the children's lunch prepared and with them again off to school for the afternoon Mother has nothing to do but prepare for the evening meal - -

Scene 15 We discover Mother standing in the kitchen She looks a trifle weary and sinks wearily into a chair and closes her eyes as though tired enough to sleep As she starts to nod as though falling asleep the door bursts open and one of the boys rushes in crying wildly and holding his hand in his kerchief Mother jumps up and unwrapping the handkerchief discovers a bad cut She starts out of the room as we cut to—

Scene 16 Mother has the youngster in the bathroom and is wrapping up the cut finger This finished she kisses the lad and they start out —cut to

Scene 17 Mother is returning to the kitchen She goes to the window and peeps out as we cut to—

Scene 18 Father is coming up the walk with his arms filled with bundles

(Continued on Page 39)

WHAT OF YOUR PROJECTION?

Some Valuable Words of Advice Regarding Your Projection Problems

By PAUL H. ALLEN, A. S. C.

THERE IS an old saying 'that the proof of the pudding is the eating' The modern version might be the proof of your cinematographic effort is the projection

No matter how carefully you light your subject and as carefully focus your lens and calculate your exposure without good projection your picture may be out of focus dimly lighted unsteady and any one of a myriad of things that can be wrong with the projector

When you first receive your film from the processing laboratory I presume you usually dash in to the living room unlimber the 16 mm projector quickly set up the screen pull down the shades and start to run the film In the course of the first few feet you quite likely will hear a chattering noise increasing in pitch as you continue and the picture starts to jump up and down This is caused by the film still being 'green' or slightly moist and the friction of the film running through the projector combined with the heat of the light makes the "emulsion" or gelatine, stick to the aperture plate The *instant* this occurs *stop* the projector and carefully clean off that little 'pick up' of emulsion for it will do more damage in the first run than a half a hundred other runs after the film has seasoned

A handy little tool can be made of the *bone* handle of a tooth-brush to remove the accumulation of emulsion in the gate of the projector Break off the brush end and with a file sharpen down the end until it has a sharp chisle-like edge and with this end you can easily scrape off the accumulation of emulsion Sometimes it is a rather stubborn thing to get off and in case it sticks in spite of the above treatment a little moisture will soften it for removal by the above tool Be sure your gate is absolutely dry before re-threading the projector

Don t ever use a metal scraper of any kind as it will scratch the metal gate and make the emulsion stick more often If your film is "jumpy" on the screen and there is no emulsion sticking to the aperture plate it is possible that the spring tension at the gate is too light to hold the film this can be adjusted by increasing the tension of the spring either by slight bending of the spring or on some models by the adjusting of a screw installed for just this purpose Too much tension at the aperture plate will cause the film to be rapidly worn out at the sprocket holes, if not actually torn

Before you run your film many times, the fewer the better make up your mind if you will ever want duplicates of it It is possible to have duplicates made of your films and the laboratory can do a much better job when the film is clean and not scratched and oil spotted

Films which have become oil stained can be cleaned with carbon tetrachloride or Carbona or Kleen-fylm Rewind the film slowly through a soft pad made of cheese cloth thoroughly moistened in the cleaning solution mentioned above, and change the position of the film and the cloth often for if there is any grit in the cloth it will scratch the film The solution will evaporate rapidly as you rewind and your films will look better and cleaner for the treatment

Carefully oil your projector according to the directions which you received with it and before running any film through it after oiling carefully wipe all surplus off the aperture plate, sprockets, take-ups and any portion where the film might come in contact therewith Oil will cause spots on your film

Most of the home projectors that I have come in contact with have dirty lenses oil spots while fingermarks are the biggest offenders To clean a lens after having removed it from the machine, carefully breath upon it and polish it with an old soft and well washed linen handkerchief until all the streaks and spots have been removed Do not take a lens apart unless absolutely necessary and if you do be sure that you put it back in the *EXACT* way you removed it For if you should happen to get the combinations together wrong you will find that it is impossible to get your picture sharply in focus over the entire screen

Check the illumination on the screen without any film in the machine see if the screen is evenly and brilliantly lighted Possibly the reflector is out of line or dirty The bulb may be old and discolored The condensor system may be dusty and finger marked In projection cleanliness in the optical system is just about the most important thing

Do not let the film stand still at the aperture with the light turned on as this will cause the film to warp, and in some of the larger machines it will actually melt the film Get a piece of mica or isinglass and cut it to the width of the film then scratch one surface with a knife Insert this in the aperture plate when you are lining up your projector The light will not affect this and you can accurately focus your projector by the scratches on the mica

(Continued on Page 41)

"Mother's Day"

(Continued from Page 37)

Scene 19 Mother dashes to the door and welcomes him with a kiss and as Father leaves the kitchen Mother starts to take the supper from the stove and carries it to the dining room Here another chemical fade out

We fade in on Title Father has worked hard so while mother does up the dishes - - - - -

Scene 20 We discover Father in the living room He is in his easy chair Cigar in mouth, feet in slippers he is enjoying the evening paper Cut to

Scene 21 Mother is in the kitchen She is washing the dishes A short shot of this and cut to—

Scene 22 The youngsters are lying on the floor in front of the fireplace reading magazines cut to—

Scene 23 Close-up of the family cat curled up in a corner

Scene 24 Close-up of the family dog asleep in another corner

Scene 25 Medium shot Mother is walking wearily into the room She drops into a chair picking up a sewing basket she starts mending sock and stockings She stops and looks up at - - - -

Scene 26 Close-up of clock with hands pointing to nine o'clock Cut to

Scene 27 She looks over at the boys and says

Spoken Title "Bed-time boys - -"

And as she finishes her title she rises and taking the boys by the hand she leaves the room

Scene 28 Mother is in the bath room turning on the water in the basin The boys come up and she scrubs their ears and necks and we cut to

Scene 29 Father close up He has fallen asleep His paper is gradually dropping from his hand It drops to the floor and his head nods sharply He awakes and stretching sleepily, he starts from the room And we cut to—

Scene 30 Mother is tucking the youngsters into bed As she gets them all tucked in, she leans over and kisses them and turns out the light Cut to

Scene 31 Mother comes into the living room and looks about She picks up her sawing basket puts it away straightens up the room and starts out as we cut to—

Scene 32 Bedroom of first scene Father is in bed justing snuggling beneath the covers Short shot then cut to

Scene 33 Dog kennel The family dog is sleeping soundly Then cut to

Scene 34 Closeup dim light, of Mother in the bedroom She is winding the alarm clock She puts it on the bureau, turns out the light and we fade out as she crawls into bed

Winter Lighting

EASTMAN gives the following valuable information for amateurs shooting winter scenes

For average distances of snow or ice scenes *f* 11 in bright sun *f* 8 if clouds partially obscure sun, and *f* 5 6 or *f* 6 5 if the day is cloudy or dull

For distance shots of the same subject close your diaphragm down one stop That is if lighting conditions call for an *f* 8 opening stop down to *f* 11

For close ups open the diaphragm one stop from the one given as correct for average distances

The use of the Cine-Kodak Color Filter and Cine-Kodak Panchromatic Film is urged for all snow scenes filmed with either an *f* 3 5 or an *f* 1 9 lens equipped Cine-Kodak When using this filter open your diaphragm one stop from normal

Kodacolor filming of snow scenes should be attempted only when the sun is unobscured and then not too early or too late in the day The half speed feature of the Model B B *f* 1 9 Cine-Kodak however adds several hours to your camera s Kodacolor day

Do not use the neutral density filter unless considerable time is to elapse between exposing and processing

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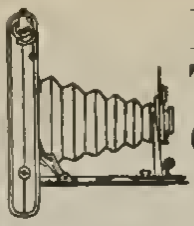
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Getting On in the World

(Continued from Page 19)

come a Surgeon But Neddermeyer found him and his flute and signed him for flute soloist with his band The band went to Detroit and there Henry Ford heard Glenn play The result was that Glenn was hired as flute soloist for the famous Ford Band which was sent to the World s Fair in San Francisco. There Glenn charmed the multitudes with his playing

However Glenn always had a yen for photography so he started experimenting with some animated cartoons in the Ford company s photographic department As a result of his success in this effort he was placed in the department and in a short time became the chief cinematographer for the Educational weekly that Ford was producing at that time

This position started Glenn on his travels that took him all over the United States Canada and Mexico From city to city Kershner journeyed making pictures of industrial operations ranging all the way from farming to the making of pepper shakers

For a year and a half he lived with the various Indian tribes, making pictures of them He went to Mexico where he won the friendship of President Obregon by the pictures he made there He was assigned to photograph President Wilson, before that President Roosevelt He climbed Pike s Peak and while on the matter of climbing let us reveal the fact that Glenn has taken pictures from most of the high places of the world including the top of the Brooklyn Bridge and the Williamsburg Bridge London Tower, the Eiffel Tower, Bunker Hill Monument Washington Monument St Peters at Rome and the Leaning Tower of Pisa

Finally, Kershner decided to come to Hollywood and try his hand here He landed at the old Goldwyn studio where he remained for three years During that time he was sent to the South Seas to Tahiti Then he was sent to Italy on Ben Hur There he took advantage of the museums of art and before he returned had spent considerable time delving into the art of the Old World

From the Goldwyn lot Glenn went to First National, after working on one picture for Paramount And he has been with First National generally with Frank Lloyd ever since

But his music was not forgotten during his work in Hollywood When the Hollywood Bowl now famous all over the world was first started Glenn was flute soloist with the orchestra which then played to but a mere handful of music lovers who made their way out to the Bowl Between concerts Glenn drew cartoons boosting the Bowl idea These were used by the newspapers, along with the publicity which Glenn created in his spare moments In other words, Kershner was the Bowl's first press agent as well as its first flute soloist

Two years ago when a band of motion picture makers started down the Colorado River in open boats Kershner was in one of the boats with his camera The hardy little group ran into difficulties and untold suffering and then one day the news services flashed the word that the party was lost For days not a word was heard and for a time it was feared that they had perished somewhere in th Grand Canyon But days later the party emerged victors over the swirling rapids and Kershner refuses to believe he was ever in great danger Instead he says the greatest hardship consisted of having to bathe in water that was filled with cakes of ice

But that's Kershner Genial happy-go-lucky, daredevil, an artist from head to toe a philosopher, a world traveler, a musician—a gentleman He gives all the credit for whatever measure of success he has attained to his wife who is just as genial, hospital and carefree as Glenn

France

A new process giving what it is claimed as complete stereoscopy is being run by Mr Beaujon General Manager of Metropol Films of France He has purchased the rights of this new system which needs a special lens and a new type screen The process is Swiss in origin

The Theater Pigalle claimed to be the most luxurious cinema in Europe has been wired by Radio Cinema the French Talking Pictures Equipment Company

Pathe-Natan intends launching a sound news reel and a truck bearing the sound equipment is already in circulation It is to be used to register all events of national interest taking place in France

Motion Picture Sound Recording

(Continued from Page 28)

In the reproduction of the sound record four factors must be considered These are- (1) the contrast laid down by the light valve and developed in the negative processing (2) the contrast of positive development, (3) the optical conditions of reproduction and (4) the electrical connection of the photocell to the reproducing amplifier The Electrical Research Products Inc , recommend that the development be checked by sensito meter strips measured in diffuse density. These are simply con trol measurements of the developing process More detailed investigation shows that if the product of positive and negative gammas so determined equals unity the sound record is satisfactory.

If the ideally perfect development is departed from by an amount which makes a difference of no more than 20% from unity as the product of the gammas, the resulting sound will be free from any distortion which can be detected A departure of 20% from the ideal processing will result in a harmonic for every frequency whose amplitude is 5% of that of the fundamental Experiments in telephone transmission have shown that distortion no greater than this is indistinguishable from distortionless transmission

A corresponding variation in development of the picture would mean the difference between satisfactory screen projection and very harsh and dense prints on the one hand or very thin and flat prints on the other, and it can be affirmed that the tolerance in the development of the sound track is considerably greater than that permissible for the picture

The application of methods of sensitometric control results in a greater uniformity in the final product with less wastage than when inspection during development is relied on In this way the demands of the sound track have led to improvement in picture quality and worked a benefit instead of a hardship

What of Your Projection?

(Continued from Page 38)

The take-up tension should not be too tight for this will cause the film to be scratched more quickly than any other form of abuse except that of fast rewinding and "cinching" the film that is, taking the slack out by holding one reel still and continuing to turn the other Both will cause "rain" scratches on the film

The other night a friend of mine was running his projector and one of his scenes was spliced in up-side-down This apparently was a habit of his for he immediately took the projector up in his hands and turned it upside down while it was still running and held it so the picture was on the screen thereby avoiding the interruption that would normally have occurred while he took it off the machine and respliced the film

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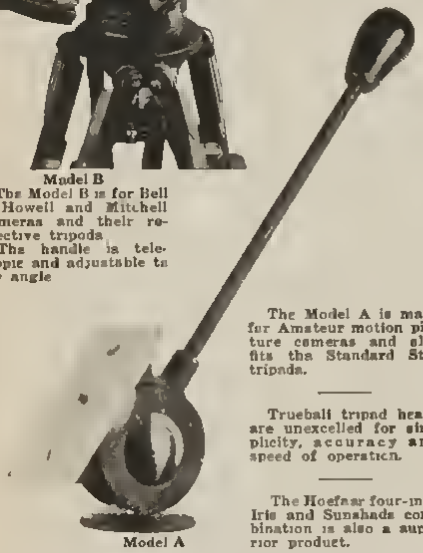

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Seventy Millimetres

(Continued from Page 9)

independently arrived at by the two most powerful producers of the early days Edison and Lumiere, coincide to within 1/1000" Now Edison's standard was arrived at in consideration solely of its use in his peep-show *Kinetoscope*, and with no thought of its ever being used for screen projection When the Armat-Jenkins designed projecting Kinetoscope was introduced the 35 mm standard film was used in it for economic reasons and was not found too unsuitable for the purpose by virtue of the comparatively small screens and short throws then used Since then, however motion picture patronage has grown to a point which demands such theatres as the 6500-seat *Roxy*, with its correspondingly large screen and colossal throw This involves a tremendous enlargement of the tiny 18 mm x 23 mm pictures Despite the great advances made with respect to the fineness of grain in modern photographic emulsions, such small films cannot be projected to large sizes without the grain becoming painfully apparent for it must be borne in mind that projection is merely the enlargement of these tiny pictures to fill the screen and the images of the silver particles forming the image are enlarged in the same measure that the image they collectively form is so that sooner or later the enlargement must reach a point where the images of these particles become apparent to the injury of the picture That point has now been reached Attempts to increase the enlargement by means of supplementary projection lenses (notably the *Magnascope* with which most large theatres are equipped) have proven it

At the same time the exigencies of the soundpicture have increased the demand for larger screens Firstly, the addition of the sound track has reduced the width of the picture-area, which was already regarded as somewhat too narrow= secondly the advent of the stage-revue type of picture has made the need for a roomier format more apparent

Under the old system—before the addition of the sound track altered the proportions of the picture—many Directors, Cinematographers and Art-Directors considered the standard four to-three proportion of the 'fame' too high in relation to its width to be perfect artistically Now with the sound track reducing this already static proportion to nearly a square even the public feels the need of a more dynamic proportion for the picture This is plainly evidenced by the numerous expedients used by theatre-owners to restore even the old rectangular proportions by means of reduced projector apertures and shorter-focus lenses

It was to meet this condition that several years ago the engineers of the Fox Company decided to devise a more practical film standard After long experimentation with literally hundreds of different frame-sizes and proportions, they finally determined upon the present *Grandeur* standard as the most suitable artistically and economically Viewed from the mechano artistic viewpoint the proportions of the *Grandeur* frame are midway between the static *root four* rectangle (2 x 4 units), and the dynamic *root five* proportion (2 x 4 5 units) The actual dimensions of the *Grandeur* frame are as stated 22½ mm x 48 mm

Viewed from a practical viewpoint the *Grandeur* proportions offer many advantages to all concerned The director can film his spectacular scenes and stage or dancing numbers to their best advantage with fewer cuts—and no need of closeups The cameraman has greater scope in his composition, and considerable advantages in his lighting For instance, the present disproportionately high sets necessitated by the more nearly square picture have made such things as backlighting increasingly difficult, in fact in many cases, true backlighting is impossible, and what passes for it is really top-lighting which must be very carefully counterbalanced by skillful arrangement of the floor lighting units—and is even then unsatisfactory Similarly, Art-directors are confronted with grave problems in the design and artistic ornamentation of the higher sets

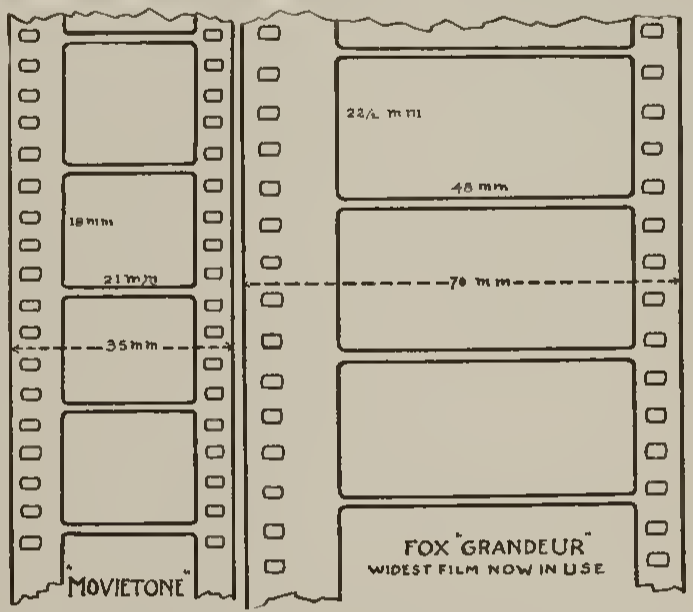
Now however, in *Grandeur*, all of these problems are reduced Direction of expansive scenes is simplified for the proportions of the 70 mm frame are such as to give ample scope for all movements with, at the same time adequately large figures The Cinematographer's task is lightened inasmuch as the sets do not have to be made nearly so high allowing the back-lightings to strike at more effective and natural angles Dance scenes need

no longer be followed as there is ample room in a normal long-shot for all the lateral movement used in most dances In practice, composition in the new format does not present nearly the difficulty that would be expected at first thought Naturally the angular field of view of the various familiar lenses are different for the new standard The following comparison of the angles included by representative lenses used on standard film with a frame 19 mm x 25 mm (Silent standard), and *Grandeur*, with its 22½ mm x 48 mm frame is enlightening

Focal length of Lens	Standard Film	Grandeur
40mm	42 52′	65 28′
50mm	34 52′	54 26′
75mm	23 38′	37 50′
100mm (4")	17 50′	28 50′

In actual practice the various cinematographers who have photographed *Grandeur* pictures recommend the use of a lens of approximately 2/3 longer focal length in *Grandeur* to secure an angle corresponding with that of any given lens in normal film Otherwise the apparatus and manipulations for phorographing *Grandeur* are identical with those for the accepted standard Naturally *Grandeur* cameras are perfectly adapted to use with the Multicolor process

To the sound man *Grandeur* offers the very considerable boon of a sound-track 7 mm wide as against 2 mm now standard This wider track permits a much greater volume-range in recording and gives better quality with a correspondingly greater volume and tone in reproduction These benefits are evident in either the Variable Density or Variable Area processes though they should be especially evident in the latter



Comparative size of Grandeur and Standard Movietone film

To the projectionist *Grandeur* also offers much In the first place the new 7mm Super-Simplex projectors, which were designed for *Grandeur*, have aside from greater stability and ruggedness, numerous features of importance, chief among which is the new location of the shutter *between the light-source and the film* This enables the film to be run far cooler and with much stronger lights At a recent showing of a *Grandeur* picture which this writer witnessed before the last reel had been rewound the aperture of the projector from which it had been taken was cool enough to touch with one s bare hand and the operator was nonchalantly cleaning it The lamp used in this particular machine was a 150 Ampere high-intensity arc considerably more powerful than would be considered necessary in normal theatre use By virtue of this cool running, and other things such as a curved projection aperture *Grandeur* projection is entirely free of buckling or weave

From the audience standpoint *Grandeur* offers a series of spectacular surprises In the first place, the new size and proportions of the screen are astounding The screen for instance in the Fox Studio projection-room—the only *Grandeur* installation so far made on the Coast—is eighteen feet high by forty feet long in a close long-shot human figures are about fifteen feet tall but with no apparent distortion nor any sense at all of being ill-proportioned Then the wide proportion selected is almost exactly that of natural vision and removes from the consciousness the dead black borderline which haunts the smaller screens The absence of this borderline gives the large pictures a pseudo stereoscopic effect which is very pleasing

Another important feature is the fact that, due to the larger image upon the film and its lesser proportionate enlargement the grain is not apparent until one approaches very close to the screen While with 35mm film the grain becomes apparent while the viewer is yet a considerable distance from the screen with *Grandeur* one can approach to within six or eight feet of the screen before noticing an appreciable graininess Furthermore there is vastly less distortion when viewed from the side than is the case of 35mm pictures

As has been remarked before the sound is vastly improved both as to volume and quality, although the standard four-horn Western Electric installation is used

Many people before having seen an example of *Grandeur* on the screen, are inclined to be prejudiced against the peculiar proportions of the new picture Viewed off hand, they do seem decidedly too wide for the height Viewed actually on the screen this is not so The proportion is so close to that of the normal angle of vision that *Grandeur* is after the first few acclimating minutes a most satisfying experience There is a small area of the retina, called the fovea wherein the image of what we see consciously falls, the remainder of the image formed on the retina we see only subconsciously but we see it just the same Now in normal film this larger image is bounded by the dead black border around the screen and a certain amount of mental concentration is required to exclude this image from our consciousness With the stage-filling picture of *Grandeur* on the other hand, we do not sense any boundaries for we see the whole screen just as we see the wide low field of our natural vision but in each case focus our attention on the important action Thus as long as the director and cinematographer exercise reasonable care in arranging their action and composition we are not sensible of any waste space at the sides of the picture, but instead trick ourselves into seeing a false depth and roundness on the flat screen

Combined with color, *Grandeur* will undoubtedly prove a revelation, the acme of perfection in present day cine methods As mentioned before tests are now being made with the new Fox-color process on *Grandeur* film similarly many of the existing color processes can easily be adapted to it While the plants of the various color firms are now strained to the utmost to meet the demand for 35mm color-films they are by no means inattentive to the possibilities of color in the wider sizes Representatives of both of the outstanding color firms Technicolor and Multicolor while admitting that their full resources were being strained to handle today s 35mm business, are agreed in stating that, as soon as the industry adopts a definite standard natural color by their processes will be forthcoming for that standard size Then, with the perfection of the modern color processes combined with the new naturalness of the wider film what more can the industry wish for?

The German Government is reported to have secured a controlling interest in the Emelka Film Co., of Munich In so doing it has apparently wished to avoid the *Emelka* Newsreel's falling into the hands of a different group

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Principles and Processes of Photography in Natural Colors

(Continued from Page 26)

film have been worked out by Ives Kelley Fox and others A typical example is one in which the first image produced is toned blue with an iron toner and, before fixing a second image is printed in the remaining silver halide During development, the alkali present in the developer converts the blue image to a colorless salt The second image is then treated with a vanadium mordant bleach and dye toned When the film is passed through an acid solution the original blue image is restored

Numerous processes have been patented for the use of double coated stock for printing the positive record

The typical two-color subtractive process is "Kodachrome" worked out by J G Capstaff, of the Kodak Research Laboratories By means of a beam-splitter optical system complementary images are exposed simultaneously on panchromatic negative film A master positive print is made by contact from the original negative By using a special projection printer, shown in Fig 18, a duplicate negative print is made from the master positive In the print the complementary images are in exact register on opposite sides of a double coated film This duplicate negative is bleached until the images have disappeared, the bleach bath hardening the film only in the parts where the image previously existed The two sides of the film are then dyed in complementary colors to the filters through which the original negative was exposed, the dye entering the film only in the unhardened areas thus producing positive dye images The color film may be projected the same as standard black and white motion pictures

Another two-color subtractive process is the 'Technicolor' This was worked out originally as a relief process but about 1928 was changed to an imbibition process The negative or master film is photographed with a beam-splitter camera as before two pictures at a time one "frame" or picture carrying the component of one set of colors, the next its complement—or if desired three-color components are used The developed negative is printed by a mechanism which jumps the negative so that the red separation images appear in a continuous film the blue images in another continuous film—in other words the positive film is moved forward one frame at a time and the negative two frames at a time. These two films are developed to produce a relief image dyed and then run along under a steel plate successively under great pressure in contact with the film to be used for projection, the dyed images being printed' much as the red blue and yellow plates are printed in making color reproductions in book printing This process has enjoyed extensive commercial success and is at present being used in conjunction with sound motion pictures

In the Multicolor (two-color) subtractive process two negative films are run simultaneously through any standard camera with their emulsion surfaces in contact (Internat Phot 1 (Aug, 1929) p 30) The front negative is orthochromatic with the surface layer dyed orange-red to act as a filter for the image recorded on the rear panchromatic film Double coated yellow dyed positive film is used for printing the pair of images in register on opposite sides of the film The images are colored by a combined dye toning and chemical toning method and are varnished before projection to protect them from scratching'

B Motion Picture Prints

Several processes have been developed of making motion picture prints on paper to be projected by reflected light but thus far no such motion picture color print processes are known A great loss of light obviously occurs with projection of prints

Summary

No attempt has been made in this article to cover the subject of heliochromy or color photography by the use of the principles of interference of light rays as worked out by Lippman Hill, R W Wood and others This process is very complicated and thus far has had no practical application The chemistry of dyes is being extended each year and some simple bleach-out process may be found

Although three color processes offer the only solution for complete and true color reproduction, a number of very pleasing two-color processes have been demonstrated, especially in the field of motion pictures

A simple process for making natural color prints still remains to be worked out, but methods of exposing three-color separation negatives have been simplified by the introduction of a screen roll film and film packs as well as the use of a tri-pack roll film In the professional field color photography processes are being used chiefly by a few skilled photographers as a basis for reproductions for advertising In connection with photo-

Cinematography and the Talkies

(Continued from Page 7)

that the average cameraman is better off financially now than he has ever been But I cannot see that he is anything like as nearly well off artistically Dollars and cents are always an important consideration, but they are not important enough to make him look beyond the job of turning ont good mechanical work to the creative art just beyond.

The cinematographer is handicapped because of the fact that except among his cinematographic friends, be can find practically no intelligent critical analysis of his work. And so often his friends will not give it to him. If I as a director make a picture, scores of reviewers will write that I have done it well or badly, as the case may be and most of them will be able to point out with more or less accuracy just where, how and why I have failed or succeeded. They will do the same for my actors But if I, or anyone, photograph that picture badly, the most that even the thorough-going critic will or can tell us is that it is good or bad—just that. Where he can analyze the faults of the writer, actor or director he cannot, no matter how willing, give constructive criticism of the cinematography So the cameraman must spur himself on to become his own critic, to analyze each scene and feel each one a challenge to his creative ability.

Screen audiences want beauty They appreciate it They need it Haven't you seen many audiences break into spontaneous applause at the appearance on the screen of some particularly beautiful photographic scene during the last few months? I have, and it proves that the audiences want the old cinematographic beauty of the silent pictures again. Therefore it is up to the cinematographer to give it to them In the old days the studios vied with each other in the beauty of their photography Today sound is uppermost in the executives' minds So the cameramen themselves must fight the battle for artistic beauty They must develop an intestinal fortitude that will bring them out of the rut into which the new order has thrown them and bring us back the magnificent cinematographic beauty that had placed them upon the pinnacle of artistic fame just before the talkies arrived. They can do it They must do it They must be creative artists in their work they must make every scene not a mere job to be turned out but a challenge to their artistic skill They must look beyond the mechanics they have so highly perfected to the inner meaning of their work—the visual art which is the true and lasting foundation of whatever artistic merit the screen can claim

Principles and Processes of Photography in Natural Colors

(Continued from Page 44)

mechanical processes however color photography has come to be used extensively

Motion pictures in color are now in common use and during the summer of 1929 an entire feature picture in color was released with musical accompaniment and dialogue Color motion pictures in the home are also a reality as at least two processes are known to be in use

The photographic world of monochrome is slowly but surely changing to a world of color

(Reprinted from 1930 edition of The American Annual of Photography)

Germany

A German film producer through a contribution to a German trade paper indicates that something like a catastrophe to the German film industry must come if it has not come already Nine producing companies in Berlin with an aggregate capital of 45 000 000 marks have failed since 1924 Ufa lost 80 000 000 marks before it reduced its capital Gross extravagance is charged against the Industry

Italy

The Italian Cines' Studios have been wired Mr Pittaluga stated at the inauguration that it was his intention to start talking picture production in January Short films are to be produced first It is reported that American equipment will be used for these productions

The Societe Anonyme des Etablissements Gaumont is raising its capital from 12 000.000 to 24 000 000 francs by the issue of 100 000 A ' shares of 100 francs at 215 francs and 20 000 B ' shares at par Subscription rights to the latter were reserved and non-negotiable

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Signor Etienne Pittaluga, the well-known Italian producer, has recently visited London He has reached an agreement with British International Pictures for a large Anglo-Italian production programme. The films will be made both at Elstree and at Rome

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The Opera Theatre and the "Sound Spectacle Syndicate" in Germany have made an agreement in view of producing films which will exhibit classical German works on the screen Mozart's 'Marriage of Figaro" and Flotow's 'Martha' will be the first productions

---

It is reported that M Grasenz Androheim has invented a new process for transmitting color films by radio; these appear at the receiving station reproduced in exact colors on an opaque slide

---

MM Machkovitch and Okhotinov have invented a new process for recording and reproducing sound Their system being based entirely on electricity light has no influence upon it It makes it possible to take photographs and register sound at any speed whatever

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According to *The American Projectionist*, the State of New York has prohibited the sale and rental of nitrate film on account of the fire risk

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